VOL. 175 No. 5 AMERICAN NOVEMBER, 1951
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Gas Journal

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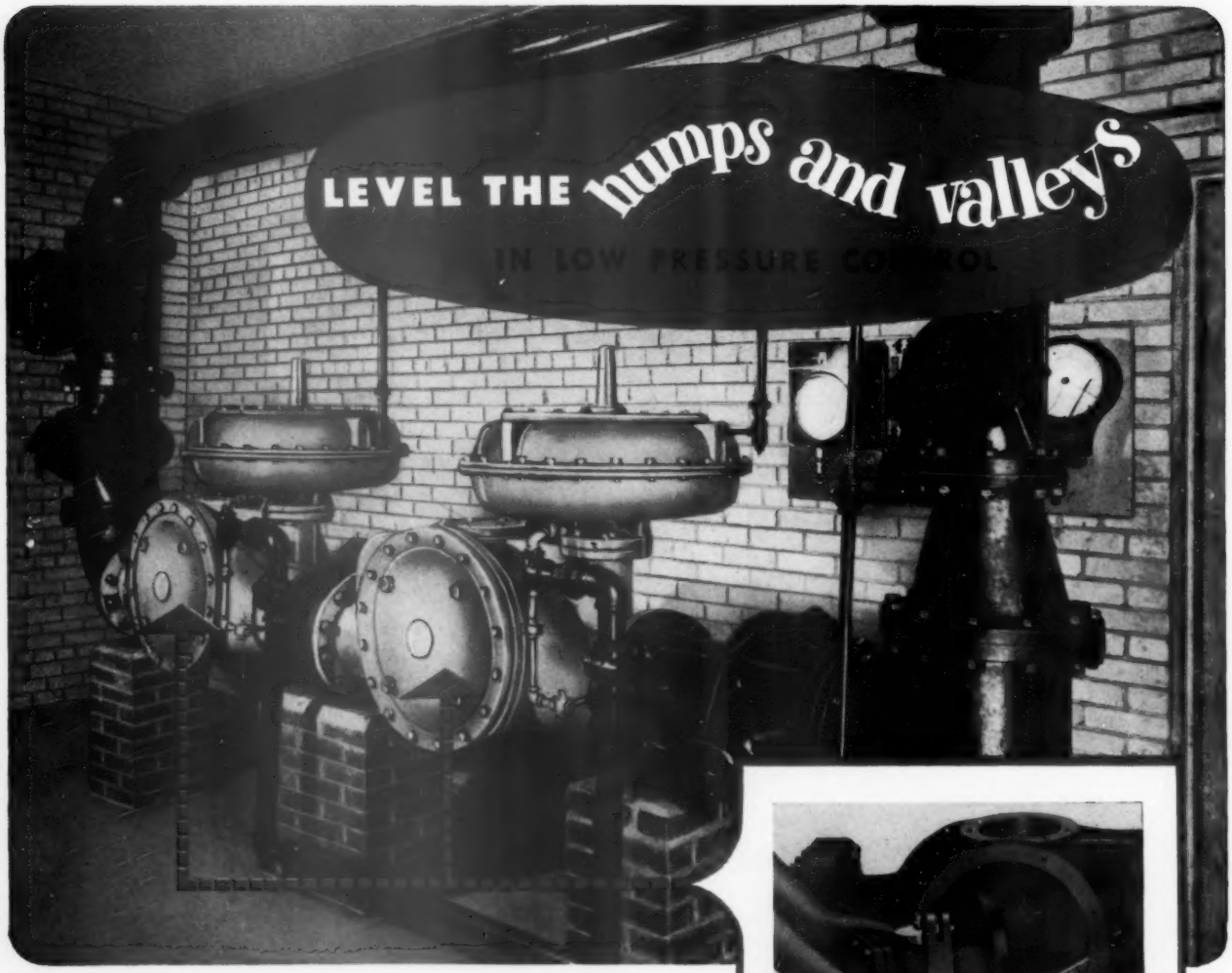

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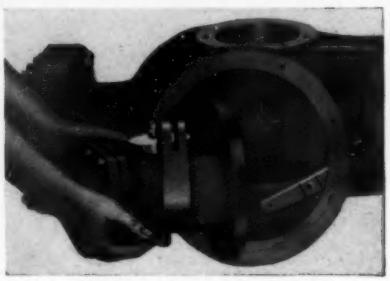

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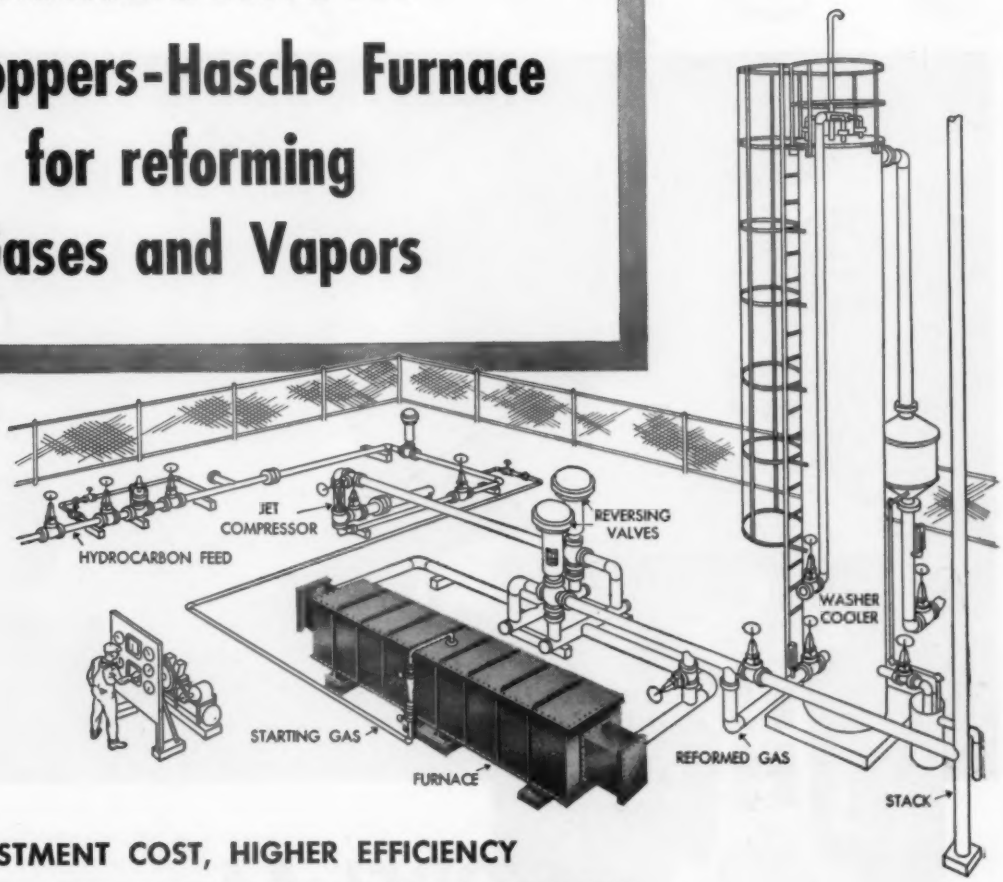

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Engineering and Construction Division, Pittsburgh 19, Pa.

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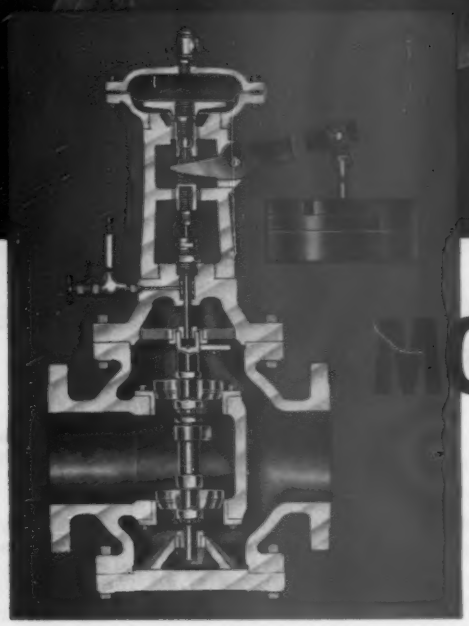

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AMERICAN Gas Journal
ESTABLISHED 1859

VOLUME 175 NOVEMBER 1951 NUMBER 6

This month...

We are not up on the protocol of the problem, but Hoyle and Post permitting, we recommend to the new AGA president, George Mitchell, that he appoint the chairman of his own board, James Oates, to head whatever committee in the association can be empowered to chart a new public relations course for the gas industry. His St. Louis address on the subject was a year's best contribution to date in this perennial discussion.

• • •

If the rule of thumb quoted by Fred Hess on page 21 for setting up research budgets is sound, three per cent of total business volume, the PAR plan should have no difficulty in securing a sizable increase in its present half million annual expenditure for the research division of that activity. Even $5 million would be only a modest one fourth of one per cent for a $2 billion industry.

• • •

Conventioneers who visited the offices of Laclede Gas Company were impressed by the beauty and completeness of the model kitchens that the St. Louis utility maintains on its first floor. We are advised that the entire customer's lobby went through a complete face lifting just before the meetings opened, but the end result was worth it, to visitors and we are confident to Laclede as well.

• • •

With all the diffident modesty of a charging buffalo we have just loosed on the industry statistics showing that AMERICAN GAS JOURNAL circulation has increased some 52 per cent in the past two years. Of course the primary purpose of such bragging is to entice more advertisers onto our 1952 pages; but the cold figures provide also some balm for the bruised editorial soul which from month to month has to absorb some terrific beatings.

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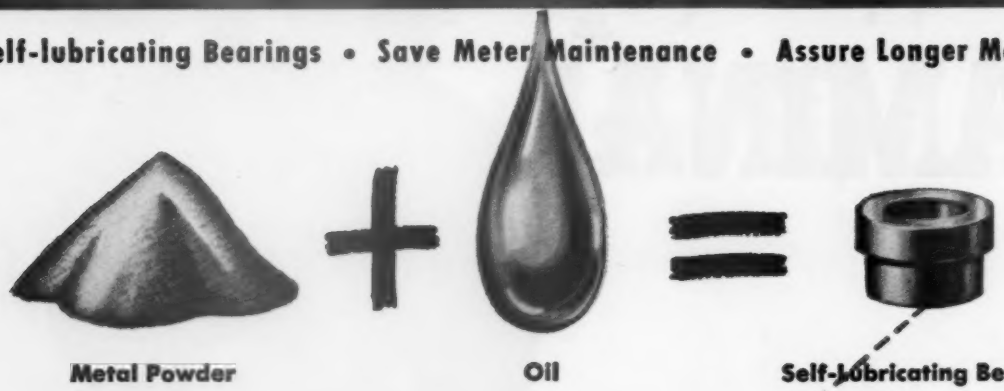

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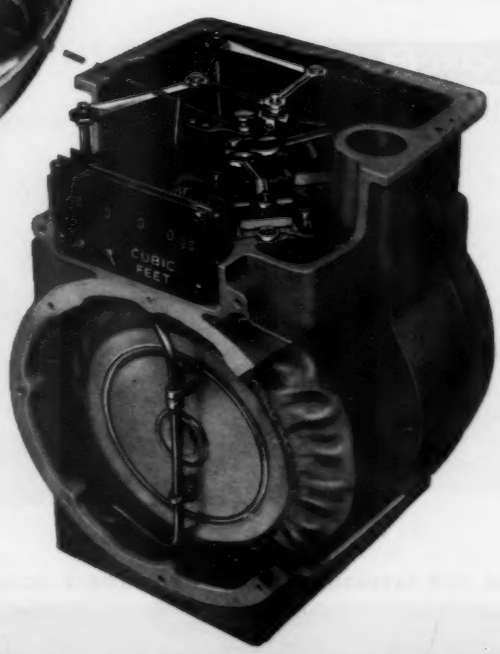

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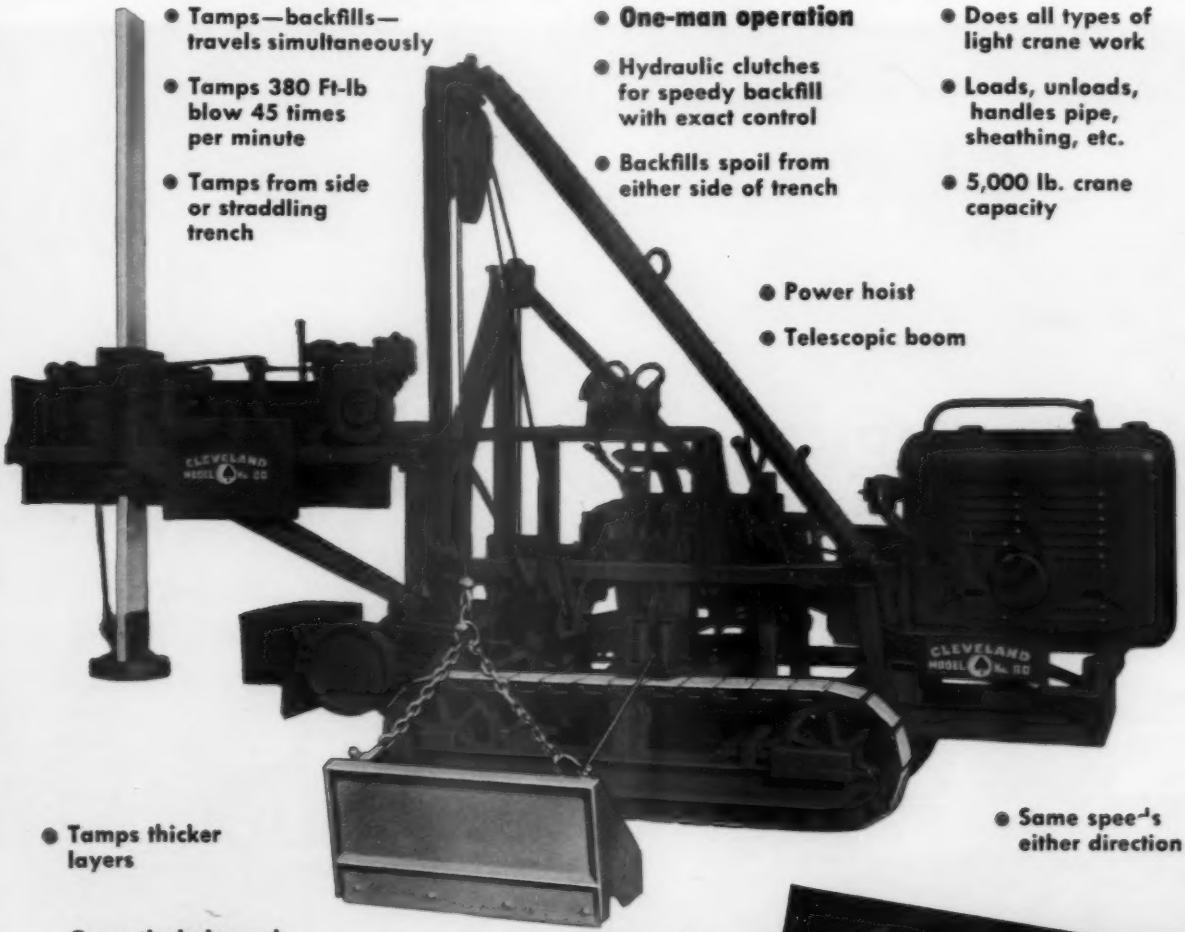

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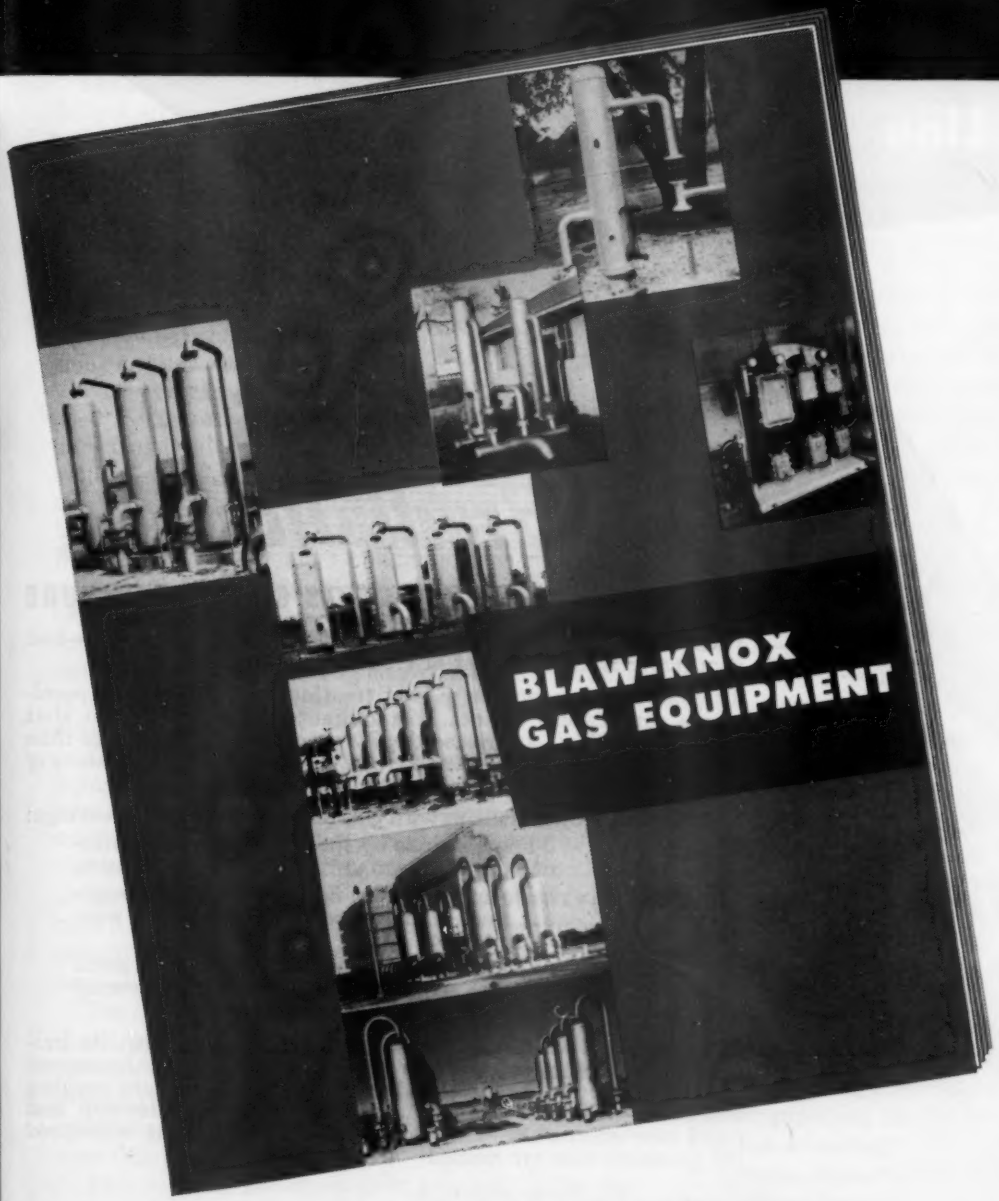

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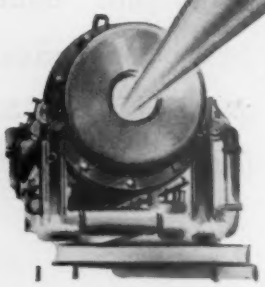

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Editorial:

Public Relations Enemy No. 1

THE report that the organized gas industry, as represented by the directing boards of both American Gas and Gas Appliance Manufacturers associations is about to tackle seriously and for the first time, the defining of appliance service responsibility is a piece of news that enlightened gas men will loudly applaud.

The mechanism of the move has not been officially defined, by either AGA or GAMA but it is generally understood that the president of the utility association will appoint a top flight committee of gas men to work with a similar policy committee from the manufacturer's group.

President George Mitchell, newly elected head of AGA is to be congratulated on a ready made opportunity thus presented to him to dedicate his administration to some proof beyond mere words that gas is awakening to a new sense of public and social responsibility.

We have earnestly urged on both associations the need for action on this vital problem. We recall that immediately after the meeting of AGA's natural gas section in Dallas, last May, the word was passed out that the organization was going to appoint a committee to do something about defining servicing responsibility. But from May to October nothing happened—except a few more hapless New Yorkers died of carbon monoxide poisoning—and the industry near and far was subject to a new wave of public and private denunciation. Obviously the issue can be avoided no longer; has in fact been avoided too long already for the good of industry public relations.

The personnel of the committee will be of great importance. It must include only men of vision and determination who have already demonstrated their personal and corporate dedication to the public interest and welfare. They must have both the will and the ability to speak freely, and each must have in his own right a standing in the industry that will assure that the collective recommendations of the group will be heeded.

The question has been raised; how can a national industry policy of minimum service standards be implemented; what assurance is there that the individual gas utilities, particularly the combination gas and electric companies, will subscribe to and abide by the standards once they have been defined?

This poses no insurmountable problem. In the first place the few utilities who have chosen to ignore or shirk their moral obligation in service matters have been abetted in their laxity by the very fact that no recognized standards do exist; consequently their own sorry irresponsibility has escaped the opprobrium of unfavorable comparison.

Once the problem has been faced squarely, and the responsibilities of utilities, manufacturers and distributors alike have been explicitly and categorically defined, the force of both industry and public opinion will go far toward dictating adherence to any sound precepts that are established.

Gas companies that are already doing a conscientious and praiseworthy job will welcome the advent of a national policy of service standards. Too often we have seen the efforts of the utilities hampered and hamstrung by shortsighted state regulatory bodies exerting constant pressure to have customer service costs eliminated from the gas rates. But even the most rate-minded commission would hesitate to condemn the customers of any gas company to sub-standard service in terms of well defined and recognized national practice.

As a matter of fact, the basic question is not one of whether appliance servicing should be free or charged for. As far as the gas company is concerned that is a distinction without a difference, since the consumers of gas service pay for it all in the long run. Once the extent and scope of responsibility for safe operation of gas equipment is understood and generally accepted, the question of distributing local servicing charges can very well be left with the operating companies. Certainly gas companies as well as rate making bodies will agree that safe operation is the important consideration, rather than whether or not the customer pays cash on the barrel head every time his equipment is put in good running order.

The manifest advantages of a national policy of minimum service standards is by now widely recognized. The gas industry will benefit, the gas appliance business will benefit, and what is of the greatest importance in the long run, the millions of gas consumers will benefit.

In our opinion the subject has been just about talked out, in association circles. The next step calls for action. Appoint the necessary committees without further delay; set deadlines by dates for their preliminary, interim and final reports; and above all let the public and the press and the industry in general know that at long last something is being done about the gas industry's Public Relations Enemy No. 1—lip service in lieu of customer service.

Elliott Taylor

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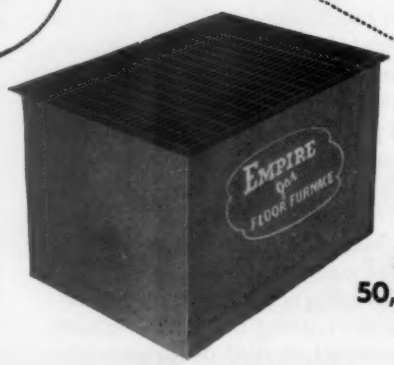

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Columbia Gas System Intensifies Pipe Reconditioning Program

COLUMBIA Gas System has stepped up its pipe reclamation project to keep pace with the overall effort to meet the unprecedented demand for natural gas. With the shortage of steel for pipe causing a bottleneck in the delivery of gas from field to furnace, Columbia's "facelifting" operations have gained considerable prestige.

The reconditioning program is going on constantly in Columbia's three Groups, whose headquarters are in Charleston, W. Va., Pittsburgh, Pa., and Columbus, Ohio. Not only pipe taken up to be replaced by larger lines, but also used drill casing goes to the nearest reclamation project. In the case of the Charleston Group, the salvaging equipment is portable, doing the work "on location" either in Kentucky or West Virginia.

Permanent Yard

Columbia's Pittsburgh Group has a permanent reconditioning installation at its Rogersville Yard in Greene County, Pa., where pipe from three to twenty inches in diameter can be straightened, cleaned and recoated. In one recent operation, twenty miles of used pipe removed from Columbia's Majorsville Field was sent to the Rogersville Yard to be reclaimed. A little more than half of it was fit for salvage. Incidentally, the reclamation project saves not only pipe, but money.

Well Casing As Well

Recently when the Charleston Group was replacing 7,800 feet of 10-inch pipe, 3,000 feet of the old pipe were reconditioned and sent right back into the ground as part of a new line. Another 2,800 feet deemed unsalvageable were left under a highway. In another operation, the Charleston Group removed 15,800 feet of 12-inch pipe. Of that 13,600 feet were reconditioned and relayed. Not long ago Charleston reclaimed 8,600 feet of 8-inch well casing, putting it back to work as pipe line. The Charleston Group has salvaged well casing from 60 wells this season.

Columbia's Columbus Group used 14,000 feet of reconditioned 16-inch pipe as part of its $300,000 gas supply line to Parma, Ohio. The reclamation job was done at the Hill-Hubbell plant in Loraine, Ohio. The process, like that used by the Pittsburgh or Charleston Groups, consists of running the pipe through a straightening machine, then through a cleaning machine which pelts the pipe with thousands of "shot." That process is followed by a coating with corrosion-resistant coal tar enamel in which fibre glass is buried. Then comes the final wrapping with heavy felt paper. Only the pipe ends are left clear to permit welding in the field.

After that the pipe is ready to return to the work of transporting natural gas from the wells to the customers.

Scenes at pipe reconditioning installation at Rogersville Yard in Green County, Penna., are:

1—Pipe brought in to be reconditioned.

2—Starting a bent joint through the reclamation processes.

3—A side view of the straightening equipment and a joint of pipe.

4—The machine that cleans and paints the pipe. A coated joint is coming out.

5—Reconditioned pipe for future use.

6—The men who do the work.

...THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

ACCIDENT (MARYLAND) HELPS SAFETY RECORD

by Hugh F. Lovering

Assistant Safety Manager
New England Electric System, Boston

As a novel approach to the 20th Annual No-Accident Month Campaign, safety messages to homes of 8500 New England Electric System employees were mailed from Accident, Maryland, on October 1. Shown are Chief System Dispatcher Clement P. Corey, of Millbury, Mass., originator of the idea; Safety Manager Frederick G. Harriman, of Boston; Postmaster Earl F. Haenftling, of Accident; and Campaign Committee Chairman John W. Gronbeck, of Providence.

THE only place for an accident is on a postmark far away from home! Development of this theme was a unique feature of the 20th October No-Accident Campaign throughout the New England Electric System. Every worker got a letter postmarked "Accident, Maryland."

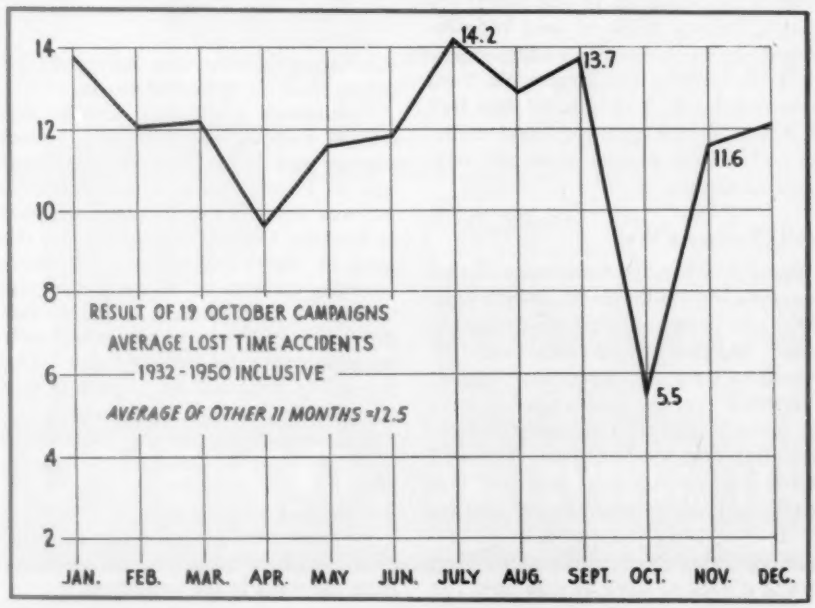
Annual campaigns during the past 19 years have changed October from the worst month for disabling injuries to the best. The October average has been 5.5 lost-time cases compared with 12.5 for the other 11 months. In October 1942, System employees worked nearly 1,300,000 man-hours without a single absence from work because of on-the-job injury.

This year, with 8500 gas and electric employees scattered over five states, the problem of direct communication was an important one. A time-tested program called for campaign publicity with striking posters and "reminder tags" for general display, with everyone receiving special notebooks, safety matches and match book holders in attractive design, all based on an orange and black color scheme. Cloth work caps with the slogan "Make It None in '51" were provided for plant workers. But the message to the home of every man and woman on every pay roll, enlisting the support of the home folk, had to be something special.

One member of the group in charge of planning this campaign, Chief System

Results of October 1951 Campaign

At press time Mr. Lovering advised the Journal that the 1951 October campaign established the best record since 1942. He reports that during October 8500 employees worked 1,500,000 man-hours with only one disabling injury.



Dispatcher Clement P. Corey of Millbury, Massachusetts, has earned the reputation of "No. 1 Idea Man" as a member of the General Safety Committee. He always comes up with an original safety stunt when one is needed.

For example, the System's accident prevention activities during 1949 were based on a Hatfield-McCoy feud, New England style. Without regard for geographical location, the eight districts—made up of distribution companies—and the five electric production divisions were divided until there were some 4200 Hatfields and 4200 McCoys. Every time a McCoy had a disabling injury it was because a Hatfield "popped him whilst bent over" and vice versa.

The clans declared a truce during October to build a dam across "Axident Creak," held lost-time accidents at three for the month—and in November went back to feudin'! Incidentally, that year the System's disabling injury frequency went down 21 per cent compared with that of 1948.

More than 8500 stamps had to be hand-cancelled by Earl F. Haenftling, postmaster at Accident, Maryland, when October safety letters were mailed to employes of New England Electric System.

Upta40 vs 40nover

During 1950 the "Fortynovers," all men 40 years of age and older, were in safety competition with the "Uptafortys," all employees under 40—including all women, regardless of age! The two groups were about evenly divided as to number and past accident experience.

Each month there was a different "Race of the Ages" with Felix Fortynover pitting his experience and know-how against Urbie Uptaforty's quicker reaction and agility. Final accident score was Uptafortys—54, Fortynovers—62 and, for the System, a 10 per cent reduction in frequency.

For 1951 there are rotating "Guardians of Safety" for every day of the week. They write friendly and helpful letters stressing prevention of recurrence to company managers and superintendents whose men are disabled by accidents occurring on the day being "guarded." Since all these safety stunts were developed from Corey's original ideas, it was not surprising that his suggestion for an October campaign home mailing piece should prove a "natural."

Accident Cooperates

In scanning the U. S. Postal Guide for a possible tie-in with safety, he came upon ACCIDENT, MARYLAND, a little Cumberland Mountain town in the western part of the state. By Correspondence, System Safety Manager Frederick G. Harriman of Boston found Postmaster Earl F. Haenftling of Accident most cooperative in helping put his community in the safety limelight.

Orange envelopes were imprinted in black with a special cachet, a section of a standard road map with a blown-up-by-reading-glass circle showing Accident on Route 495. The wording read, "A Message from Accident, Maryland to the Home Folk of the New England Electric System."

Addressed at the central mailing point for the System's employee magazine, *Contact,* the envelopes had inserted the home message and an attractive 4 x 9 inch blotter bearing the 1951 calendar version of the Annual Campaign month and the slogan "October Is Here for the 20th Year."

The completed mailing pieces were taken in bundles over the road to Accident early in September by Safety Manager Harriman, "Idea Man" Corey and John W. Gronbeck, of Providence, R. I., chairman of the campaign committee. Through previous arrangement with a local photographer, an excellent picture of the group delivering the bundles to Postmaster Haenftling was secured for the front cover of the October issue of *Contact.*

There remained for the postmaster the task of affixing over 8500 three-cent stamps, hand cancelling them and mailing the messages with a postmark reading "Accident, Md., Oct. 1, 1951, 9 A.M." Within a day or two System people all over New England began to receive what to many became real collector's items. This novel method of communication caused much favorable comment and proved well worth the effort involved.

Accident Was an Accident

How Accident got its name is interesting. It was founded on a grant of land from King George II to an early settler who was allowed to pick the location of 600 acres anywhere in western Maryland. The grantee sent out two survey parties, independently, to select the best site.

Each party, with no knowledge of the other's presence on the assignment, selected an identical tract of land starting at the same "tall oak tree." This was patented "The Accident Tract"; hence the name Accident. The spot where the oak tree once stood is near the center of town, right opposite Postmaster Haenftling's family home.

So a desirable Accident became the source of a unique appeal to "Make It None in '51" as far as the kind of accidents to be prevented in the New England Electric System people during October is concerned. It is felt that any success for October 1951 will be due, in part at least, to one of the most unusual personal appeals ever made to the workers of a public utility organization—that from Accident, Maryland.

Rate Increases Before FPC Total $106,000,000

The total amount of proposed rate increases pending before the Federal Power Commission has passed the 100 million dollar mark for the first time, with the filing of an application by Transcontinental Gas Pipe Line Corporation, of Houston, Tex., for an increase of approximately $13,600,000.

Transcontinental's proposed increase, which is estimated on the basis of 555 million cu. ft. per day delivery capacity for the year 1952, brings the total of pending rate increases to more than $106,000,000 annually.

With the exception of Transcontinental's proposal, which is under study by the staff, all of the proposed increases have been suspended by the FPC pending a determination of their reasonableness. The increases involve 18 interstate companies, including Transcontinental.

...THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

Engineering and Economic Factors Dictate Gas Main Sizing

by W. J. Lutz and J. H. Miller
Public Service Electric and Gas Co., Newark, N. J.

AMONG the characteristics of the gas public utility business is the fact that the utility company is obliged to lay mains to keep pace with the increasing demand and growth of its territory. These distribution mains constitute by far the largest single item of the fixed capital of a gas utility. In the case of the Public Service Electric and Gas Company, it amounts to about 36 per cent.

Cost-capacity Ratio of Mains

It is an economic fact that the cost of cast iron gas mains is not directly proportional to the capacity as is nearly the case of other gas equipment such as compressors, turbines, motors, etc. For example, there is the large group of gas mains whose diameters bear the installed cost ratio of two to three but have the capacity ratio of approximately one to two, i.e., for a 50 per cent greater investment there is obtained 100 per cent additional capacity. These relationships apply to the following size mains:

6″	diameter versus		8″	diameter
12″	″	″	16″	″
24″	″	″	30″	″
30″	″	″	42″	″

There is a second group whose diameters bear the installed cost ratio of three to five and the approximate capacity ratio of one to three, i.e., for a 67 per cent greater investment there is obtained 200 per cent additional capacity. These relationships apply to the following size mains:

8″	diameter versus		12″	diameter
16″	″	″	24″	″

Also, there is the special case of four inch and six inch mains whose diameters bear the installed cost ratio of only three to four and the approximate capacity ratio of one to three, i.e., for a 33 per cent greater investment there is obtained 200 per cent additional capacity. This highly favorable relationship between cost and capacity is due to the fact that the capacity increases as the $\frac{5}{2}$ power of the diameter (Pole, Cox and Spitzglass formulas—Weymouth is $\frac{5.3}{2}$ power) while the installed cost ratio is more nearly directly proportional to the diameter.

Economics of Cost-capacity Ratio of Mains

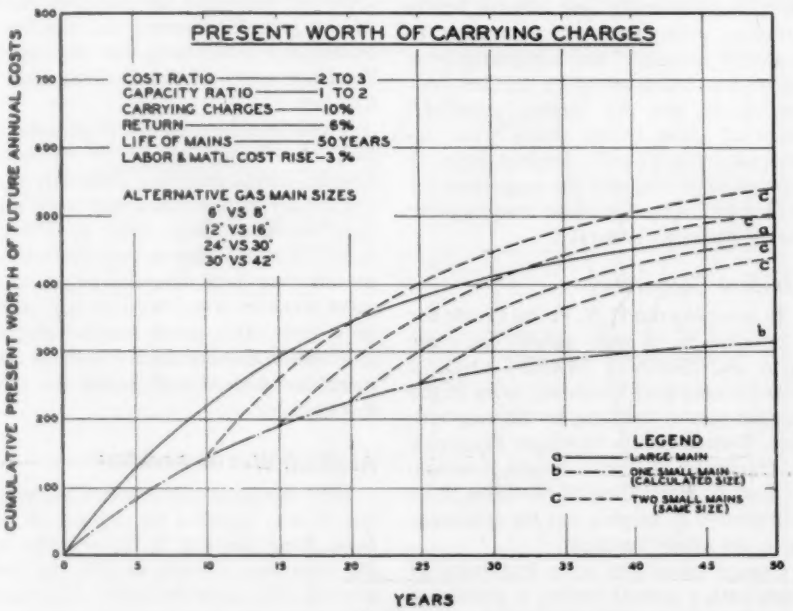
This fact, which has a definite long range bearing on costs to the gas utility company, may be overlooked by the distribution engineer when he is confronted with the economic problem whether to lay a certain calculated commercial size main or the next size larger, if he does not give true weight to the total future carrying charges of both mains. The engineering calculation of the main size to meet an estimated future load is generally based on a flow formula which takes into consideration values of the following factors:

1. Flow of gas in cubic feet per hour. (Contemplated changes in the Btu content of the gas must be considered.)
2. Pressures—initial and terminal.
3. Specific gravity.
4. Length of line.

No solution can be obtained until values have been assigned to the above factors. However, after a certain calculated commercial size has been agreed upon, it is necessary to investigate the dollar economics of this size and the next larger size. It is the purpose of this study to emphasize the necessity of making a comparison of the present worths of future annual costs of both size mains and show that short-sightedness in selecting the main based purely on first cost may be expensive.

Graphic Solution

This cost comparison lends itself to a graphic presentation and solution. Since capital commands an annual rental (return), the time value of money must be



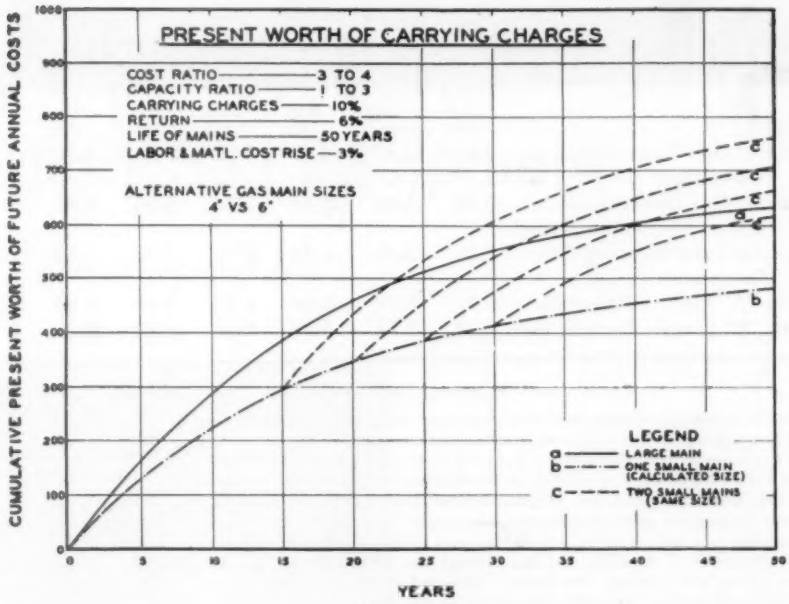
Curve 1.

Presented at annual convention of American Gas Ass'n, St. Louis, Oct. 15-17, 1951.

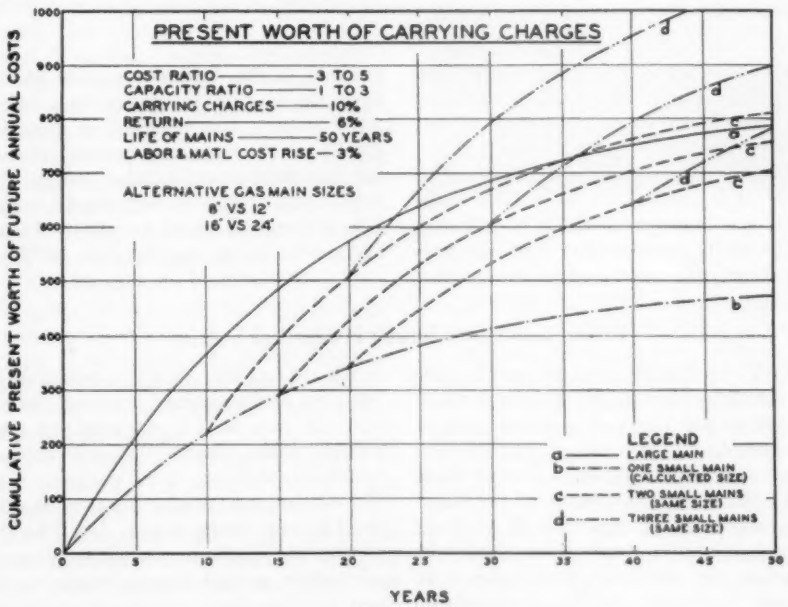
recognized. In comparing plans or programs which include expenditures at future periods, the effect of compound interest must be recognized by comparing the plans on a present worth basis.* This results in a curved line relation.

Curve 1 shows graphically the present worths of future annual costs throughout the stated period of the calculated main and the corresponding larger main of the four groups listed which have a cost ratio of two to three and a capacity ratio of one to two. The ordinate of the curve represents present worth of future annual cost units. For example, if 200 units represent the investment cost of the calculated main, 300 units will represent the investment cost of the larger main (cost ratio two to three). The abscissa represents years.

The present worth of future annual costs for the small main for 20 years calculated on a 10 per cent carrying charge of which 6 per cent is return on investment is 229 units.† Correspondingly, the present worth of future annual costs for the large main for 20 years is 344 units.


PRESENT WORTH OF CARRYING CHARGES
COST RATIO — 3 TO 4
CAPACITY RATIO — 1 TO 3
CARRYING CHARGES — 10%
RETURN — 6%
LIFE OF MAINS — 50 YEARS
LABOR & MATL. COST RISE — 3%
ALTERNATIVE GAS MAIN SIZES
4" VS 6"
CUMULATIVE PRESENT WORTH OF FUTURE ANNUAL COSTS
YEARS
LEGEND
a — LARGE MAIN
b — ONE SMALL MAIN (CALCULATED SIZE)
c — TWO SMALL MAINS (SAME SIZE)

Curve 3.


PRESENT WORTH OF CARRYING CHARGES
COST RATIO — 3 TO 5
CAPACITY RATIO — 1 TO 3
CARRYING CHARGES — 10%
RETURN — 6%
LIFE OF MAINS — 50 YEARS
LABOR & MATL COST RISE — 3%
ALTERNATIVE GAS MAIN SIZES
8" VS 12"
16" VS 24"
CUMULATIVE PRESENT WORTH OF FUTURE ANNUAL COSTS
YEARS
LEGEND
a — LARGE MAIN
b — ONE SMALL MAIN (CALCULATED SIZE)
c — TWO SMALL MAINS (SAME SIZE)
d — THREE SMALL MAINS (SAME SIZE)

Curve 2.

The 10 per cent carrying charge used in these sample calculations is the sum of return on investment, depreciation, federal income taxes, and gross receipts taxes. As these components may vary with different gas public utilities, any specific calculation must be based on the values that apply to that company.

It is obvious that, if the predicted load for the 50 year period can be met by the calculated main, there is no need to install the larger main and be burdened with the higher carrying charges over the 50 years.

However, if the predicted load exceeds the capacity of the calculated main before the expiration of its 50 year expected life, and it becomes necessary to lay a duplicate main, then the dollar economics of laying the larger main in the first place must be investigated. For example, if a calculated main reaches its peak capacity in 15 years and it becomes necessary to lay a duplicate main at that time, the carrying charges from then on will be for both mains.

Rising Material and Labor Costs

If the past trend continues, the cost of the second main laid 15 years later, will be higher than today. Cast iron pipe has more than tripled in cost in 50 years (actually 3.8‡). This amounts to a 2.6 per cent average annual increase. Common labor likewise has had more than a sixfold increase in wages from 1910 to 1947,‡ which amounts to a 5.0 per cent average annual increase. For purposes of this study a combined material and labor cost increase of 3 per cent per year in the installed cost of cast iron gas mains has been assumed. This is reasonable in light of the past experience recorded, and the fact that the cost of laying the second main years later is in itself more costly due to encountering subsequently laid subsurface structures and to more expensive street repaving.

Cost of Future Mains

The actual probable cost of the second main laid 15 years later will then be 312 units (compound interest factor @ 3 per cent per year for 15 years is 1.56) compared to 200 units today, and hence the carrying charges of the two mains will be based on a total of 512 units instead of 400 units (two mains @ 200 each) from that date on. The carrying charges for the large main are still based on the original 300 units. In this example, the present worth of future annual costs for the two small mains based on a 10 per cent carrying charge will exceed that of the large main at some future date. This is graphically shown on Curve 1 by line "c" starting at 15 years. It crosses line "a" (large main) at about the 32 year mark which is the "break even" point, i.e., that point of time when the present worth of future annual costs of the large main are equal to the present worth of future annual costs of the two small

(Continued on page 47)

* See "Principles of Engineering Economy," by E. L. Grant.

† 200 X 0.10 X 11.47 (present worth at 6 per cent return of a 20 year annuity) = 229.

‡ Engineering News-Record.

THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

Index of Yields : Selected Utilities Stocks

	Oct. 1951	Sept. 1951	Aug. 1951	July 1951	June 1951	May 1951	Apr. 1951	Mar. 1951	Feb. 1951	Jan. 1951	Dec. 1950	Nov. 1950
Natural Gas Transmission Companies	4.67%	4.67%	4.65%	5.07%	5.26%	5.35%	5.22%	5.38%	5.31%	5.36%	5.97%	5.62%
Natural Gas Transmission & Distribution Companies	5.36	5.09	5.11	5.24	5.30	5.45	5.43	5.35	5.31	5.47	5.67	5.46
Manufactured & Mixed Gas Companies	5.32	5.43	5.46	5.52	5.22	5.35	5.23	5.22	5.21	5.22	5.56	5.46
Class "A" Electric Companies	5.83	5.74	5.69	5.97	5.95	5.88	5.52	5.49	5.65	5.62	6.19	6.03
Class "B" Electric Companies	5.78	5.74	5.78	5.86	5.88	5.94	5.72	5.66	5.78	5.80	6.38	6.06

Method of Compiling Index of Yields

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

The companies used in compiling this index are:

Natural Gas Transmission Companies: El Paso Natural Gas Co.; Northern Natural Gas Co.; Panhandle Eastern Pipe Line Co.; Southern Natural Gas Co.; Tennessee Gas Transmission Co.

Natural Gas Transmission and Distribution Companies: Columbia Gas System, Inc.; Consolidated Natural Gas Co.; Lone Star Gas Co.; Oklahoma Natural Gas Co.; Pacific Lighting Corp.

Manufactured and Mixed Gas Companies: Bridgeport Gas Light Co.; Brooklyn Union Gas Co.; United Gas Improvement Co.; Peoples Gas Light & Coke Co.

Class "A" Electric Companies: Boston Edison Co.; Commonwealth Edison Co.; Houston Lighting & Power Co.; Southern California Edison Co., Ltd.

Class "B" Electric Companies: Dayton Power & Light Co.; Hartford Electric Light Co.; Pennsylvania Power & Light Co.; Public Service Co. of Colorado; San Diego Gas & Electric Co.

John F. Falvey

ANY fears which may have been entertained concerning the stability of utility stocks should have been dissipated by their commendatory market performance in the short but sharp market break late last month.

While the averages for industrial company shares as a group fell ten points in three days, utility stock averages in the same period receded less than one point from their previously attained 20-year high mark.

The reason, or one might say a principal reason, for this is not hard to find. During the past several years an increasingly heavy volume of utility common stocks has been finding its way into the portfolios of investment trusts, fire insurance companies, trust accounts and pension funds. These holdings were practically untouched during the period of market unsettlement last month.

To quote a high official of one of the country's leading investment trusts: "Where would we put the money if we should decide to sell some of our common stocks? We cannot buy short term governments; the long-term governments are a decided risk because of vacillating administration policies; and sale of common shares now would leave us with the necessity for reinvesting our funds at some later date into the same section of the market from which we would now be withdrawing. Meanwhile by holding on we continue to get the benefit of our good yields."

Maintenance of a constructive common stock attitude by these fund managers has been much more of a factor in the utility share market than any buying from life insurance channels. According to the figures compiled by the Institute of Life Insurance only about $100 million was invested in common stocks by life insurance companies during the eight months ended August 31, 1951. This compared with the $138 million of common stocks bought by the life companies in the comparable 1950 pe-

(Continued on page 46)

Trend Seems to Favor Preferred Stocks

REVITALIZATION of the market for utility preferred shares may be witnessed as the result of a broadening of the investment powers of mutual savings banks. Elliot V. Bell, former New York State Superintendent of Banking, has recommended that New York State savings banks be permitted to invest in equities. Mr. Bell points out that it is unwise to restrict to fixed obligations the investment of the vast amount of funds flowing to savings institutions; that investment in equities will permit greater diversification and higher income for savings banks; that industry's needs for equity capital, because of high income tax rates, can no longer be furnished by wealthy investors, but can only be forthcoming from the savings of the many, as they are channeled through our thrift institutions.

August Ihlefeld, president of the Savings Bank Trust Company of New York, noting that mutual savings banks have become subject to Federal income taxation, has declared that "the case for equity investment by these institutions is stronger than ever." Not only is there a wide disparity between bond and stock yields, but, since intercorporate dividends are taxable only to the extent of 15 per cent of the amount received, the actual tax rate is 7.8 per cent as contrasted with taxable interest income which is subject to a 52 per cent rate. "In view of the favored position of dividend income under the tax law," he declares, "consideration should be given to permitting mutual savings banks to invest in high grade preferred and common stocks meeting specified tests, in lieu of corporate bonds. Such preferred stock investment authorization should be apart from any authority to invest a limited amount of their funds in common stocks."

Although savings bank investment in equities is now under active discussion, legislative permission may not be immediately forthcoming. However, the trend toward liberalization of investment seems clear, and such liberalization could provide new and powerful buyers for utility preferred shares which, as a group, have a long and impressive record of stability. Such demand could well result in the partial substitution of preferred stock for common stock and funded debt in new utility financing.

New Orleans Utility Sells Gas Heating And Dealers Sell Equipment

by David Markstein

GAS appliances are actively sold to consumers by New Orleans Public Service, Inc. under a co-operation plan whereby the profits on appliance sales go to the local dealers. Public Service campaigns actively to promote the comfort, convenience and economy of modern heating and cooking with gas. And after its contact representative, or the outside sales force is called, have done the job of making consumers want new gas equipment, the utility sees that the sales are made by local dealers and heating contractors.

Public Service men write no orders, supply no equipment, and take no share of the profits. Prospects are turned over to regular dealers, whose salesmen then go out and close the orders. The utility's efforts not only do not arouse resentment among the established dealers—they are roundly applauded.

"Our interest, like that of every utility company, is in increasing local gas consumption," explains E. N. Avegno, director of the dealer cooperation program of New Orleans Public Service, Inc.

"Some utilities believe in making sales themselves. We do not compete in any way with the city's dealers. Rather, we try to work with them. New Orleans Public Service, and each of the dealers, have a common aim: To get more gas appliances in use. We gain by bringing this about in that we sell more gas. The dealer gains by making his sale. Anything our contact representatives, our staff of planning experts, can do to help along a sale is done."

Direct Mail Service

Mr. Avenog cites as an instance of Public Service's plan to help-the-dealer-make-the-sales the mailing set-up of the utility.

"We'll address—without charge for our lists, time, or work—any mailing pieces for New Orleans equipment dealers," he says. "Say, for example, that a dealer wants to get out a three-letter campaign to sell plants and institutions—big customers. He has catalogs, broadsides, and other stuffers he wants to include.

"He could send them to his own account lists. But in that case, he would reach only a part of the total number of prospects in the South's largest city. And in addition, he would have to hire extra help to do the addressing, and the digging out of names and addresses—or else tie up his regular office force on the job.

E. N. Avegno

"Or he could consult the latest city directory or classified telephone directory. These would give him long, complete lists—but not necessarily the names of executives at the companies he wished to reach. And he would still have the problem of gathering the names and addressing the envelopes—no small expenditure of time and effort.

"But we urge him to bring his envelopes to us. For we have the lists. They are classified, broken down, ready to use. And they are on addressing plates, saving much time. Every firm in the city purchases gas and electric service from us, and we keep our customer lists classified for just this purpose.

"If Mister Dealer does come to us, we take his envelopes, pull out the right lists, and address them. With no time or money tied up in the project, he has the use of an active list. We turn the envelopes back to him for stuffing and mailing. We always advise dealers to handle mailings like this under a postal third class permit number. That saves on postage as well as time.

The twenty contact representatives of New Orleans Public Service Inc. do not wait to receive calls from prospects. Regular calls are made. On these calls, the representatives try to advise about how to do a job better with new equipment.

All of the prospect leads that are developed by these calls the contact representatives make are turned over immediately to the dealers for follow-up. The representatives make an effort to discover just which brand, and which dealer, the prospect prefers, and then contact that man for the follow-up. In case there is no dealer preference, they try to discover brand preferences in order to know which dealer should get the call. If a prospect isn't sure just which brand he prefers, the practice is to notify all dealers whose equipment fits his need, and let their salesmen compete for the order. The company maintains strict impartiality in recommending brands, supply houses, and equipment dealers."

Expert Advice

The service goes farther than merely advice and sales help given by the contact representatives.

"We maintain experts here at headquarters to assist prospects with planning, designing—anything remotely connected with equipment that uses our power or our gas," notes the head of Public Service's dealer cooperation program. "Dealers are always invited to bring their prospects to see our experts for specialized help—at no charge to either prospect or dealer."

Range, Water Heater Shipments Pass 1.5 Million

Shipments of domestic gas ranges passed the one-and-three-quarter-million mark and those of automatic gas water heaters surpassed one-and-a-half millions in the first nine months of this year, according to Edward R. Martin, director of marketing and statistics of the Gas Appliance Manufacturers Association.

...THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

AGA Meeting Indicates Increased Interest In Public Responsibility

IN an atmosphere reflecting a new industry dedication to public and social responsibility, and devoid of much of the fulsome selfpraise that has marked many previous convocations, 2,500 members of the American Gas Association, friends, observers and guests met in St. Louis October 15 through 17 in the thirty-third annual convention of the top organization of the gas business.

D. A. Hulcy, of Dallas, covered the highlights of industry advancement during his regime as association president, and emphasized in particular the contribution that gas has made toward raising the standard of living in America. Specifically he pointed out that "the price of gas service to the households of the country has remained practically unchanged during a period when the prices of almost everything else were soaring." He declared that in the period since the outbreak of World War II, food prices have increased by over 100 per cent whereas gas on the average costs only two per cent more than it did in prewar days.

Enunciating a conviction at variance with that of many in his audience, C. Pratt Rather, deputy administrator for gas in the Petroleum Administration for Defense, said that it is now apparent that the gas industry is better off under PAD than it would be as an independent defense supporting agency. "In a broad sense," said the speaker, "the gas industry is becoming more and more a part of the oil industry. . . . The gas industry leans heavily on the oil industry for its supplies and the oil industry must value the gas industry as one of its most important consumers and means of marketing its products."

Mr. Rather also advanced a plea that industry supply its best men when called upon to help staff PAD. "There is criticism from some sources of industry men in government," he said, "but God help government and industry too if this sensible alliance is not maintained."

Getting along with government was also the general theme of a panel discussion during a joint session of the natural and manufactured gas departments of the association presided over by George F. Mitchell, Chicago, and Charles E. Bennett, Pittsburgh, first and second vice-presidents, respectively, of the association.

Left—D. A. Hulcy
Right—Frederic O. Hess

Mr. Hulcy is retiring president of AGA, and Mr. Hess retiring president of GAMA.

Under the announced title, "Expediting Gas Industry Business with Government Defense Agencies," a panel of seasoned Washington experts answered questions from all-comers. The panel members included: directors, Walter E. Caine, gas planning division, A. Dale Green, gas operations division, Louis C. Sonnen, gas facilities division, all of PAD; Justin R. Wolfe, former general counsel of PAD and George H. Smith, who maintains the Washington office of the AGA. F. M. Banks, Los Angeles, acted as moderator.

P. P. Stathas, Chicago utility analyst addressing the first general session, noted that unless regulatory bodies allow earnings required to attract capital, the gas industry may encounter new problems in financing its future development and expansion programs. "As funds have been forthcoming in the past," he concluded, "so they will be in the future if investors are satisfied as to the position and prospects of the industry."

The rapid growh of the Minneapolis Gas Company in the ten years since that utility turned to the distribution of straight natural gas was detailed before the Tuesday general session of the convention by Harry K. Wrench, president of that utility. Total industrial sales increased from 257,937 Mcf in 1940, with a revenue of $220,215 to 12,888,146 Mcf in 1950 bringing in a revenue of $3,092,186.

Other information on the Minneapolis operation disclosed that the company has spent $10 million on construction since 1940; payrolls have increased from $1,500,000 to $4,400,000 in ten years; operating revenue is up from $5.6 million in 1940 to $14.8 million in 1950; and the average selling price of gas decreased from 11.66 cents per therm to 4.94 cents per therm in the same period, while net return from operations before fixed

charges increased from $1,400,000 to $2,100,000.

Stating his conviction that firm industrial customers cannot be considered interruptible Mr. Wrench said: "We have no intention of doing so any more than we would expect to interrupt gas service to a domestic heating customer."

A million new homes will be needed next year, of which a minimum of 850,000 units will be required to house defense workers, in the opinion of Frank W. Cortwright, of the National Association of Home Builders, Washington, D. C., one of the speakers in the Tuesday general session. Federal housing agency studies show that last year 60 per cent of all new homes were gas heated, compared to 47 per cent ten years ago. "Gas heating units have made economies in construction possible, and have helped builders hold the line on prices," the speaker concluded.

Frederic O. Hess, retiring president of Gas Appliance Manufacturers Association, and president of Selas Corporation, Philadelphia, developed the theme of public responsibility when he said: "We have built and operate the greatest fuel distribution system ever conceived, which has grown to such importance in our overall economy that we must further develop it—because the gas industry today has assumed a major responsibility for the operation of our economic system.

"Sales policies, merchandising, advertising campaigns, as important as they are for subsistance, are in the long range under the influence of research and development; of ingenuity and of far reaching plans for supply and quality performance."

"The proved need (for research) in a technical progressive society appears to be, at present, about three per cent of the total business volume, or for our two to three billion dollar industry, approximately one hundred million dollars annually. Let us frankly admit that such an amount is many times in excess of the research expenditures of the entire gas industry."

The GAMA president further made a plea for a study looking toward the integration of the gas fuel system through such measures as more extensive interconnection of pipelines, and the construction of gas standby plants on the sites of known large coal reserves. This aspect of Mr. Hess' proposal is presented in more detail on page 24.

In view of the new and accelerated interest in public relations that has been evidenced by AGA members the address, "Public Relations of the Gas Industry," by James F. Oates Jr., of Chicago, drew one of the biggest audiences to attend any single session of the convention.

Left to right: J. F. Merriam, Omaha; Erick Larsen, New York; Allan W. Lundstrom, Columbus.

Left to right: Lester J. Eck, Minneapolis; R. D. Lewis, St. Louis; C. C. Young and F. W. Rosencrans, Kansas City, Mo.

Left to right: A. V. Brashear, Detroit; E. J. Boothby, Washington, D. C.; W. H. Adams, New York; A. H. Burger, St. Louis.

Left to right: Louis Ruthenburg, Evansville; N. B. Bertolette, Hartford; F. M. Banks, Los Angeles.

Left to right: N. Henry Gellert, Seattle; Charles H. Gueffroy, Portland; H. K. Wrench, Minneapolis.

WILLIAMS...THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

Left to right: Charles P. Crane, Baltimore; James F. Oates, Jr., Chicago.

The speaker posed the problem of whether the gas industry should go into a public relations program, a matter which he has discussed with industry leaders on several previous occasions. In summation, Mr. Oates stated the following conclusions with respect to an industry public relations program:

1. Public relations is fundamentally the responsibility of the individual company. Any industry wide program must also meet the needs of each particular company and community.
2. Every company should be encouraged or forced by moral suasion to formulate its own local program based on the fundamentals of maintenance of high standards of service and the encouragement of the merchandising of highest quality appliances.
3. Combination companies must face the responsibility of keeping their gas service, promotion and standards of quality equal in every respect to those maintained for their more profitable electric operations.
4. The American Gas Association as the organized voice of the industry should provide leadership, data, patterns for programs and expert staff guidance to service local public relations programs. To assist the association, member companies should be prepared to assemble and supply information whenever required.
5. The association should promote the recognition and publication in national magazines of articles, studies and special stories on gas service.

If a program is instituted and pursued along these lines, in the opinion of the speaker, public confidence will follow.

Many speakers in the three days of sessions devoted themselves to some aspect of the ever present problem of selling gas appliances, and to the advertising and promotional plans around which selling revolves.

In a customers activities group session, the merits of the budget payment plan, whereby gas house heating bills are prorated over a twelve-month period instead of falling due entirely in the heating season, was discussed. F. J. Maguire, of Boston, reported that a study made by the customer collections committee disclosed that of 295 reporting companies, 141 had budget payment plans in effect. He said: "With very few exceptions companies who reported on the budget plan gave very favorable opinions."

In the field of commercial cooking, Leon Ourusoff, Washington, D. C., revealed that only about eight per cent of the gas companies participate in any kind

Left to right: Carl H. Horne, New York; W. Paul Jones, Evansville; Irving K. Peck, Pittsburgh.

of joint promotional programs with their local restaurant associations. "In 1949," he said, "gas appliances accounted for 84 per cent of the dollar sales of commercial cooking equipment. The 1951 estimate is that this will have fallen to 74 per cent, with electrical appliances coming up from 16 per cent to 26 per cent."

Increased selling activity in another field was urged by James I. Gorton, CP range campaign promotional manager for GAMA. Stressing the theme that, "automatic is the buy word," he pointed out that while sales of all gas ranges were up 24 per cent for 1950 compared to 1947, sales of automatic ranges built to CP standards increased 144 per cent.

The operating section, under the chairmanship of R. Van Vliet, Staten Island, N. Y., had a full program of technical papers which occupied full afternoon sessions for two days. Many of the papers represented reports on work in progress under the auspices of such various committees as distribution, under V. F. Bittner, Chicago; gas production, chairmaned by G. T. Bentley, Detroit; corrosion, with A. H. Cramer, Detroit, and motor vehicles under P. W. Rogers, of Columbus, Ohio.

One of the most complete papers delivered before the section was that of E. G. Boyer, Philadelphia Electric Company, who analyzed the factors that led his company to the conclusion that changeover to straight natural gas distribution would not be advisable, and indicated instead that the preferrable course would be to step up their pre-natural gas sendout to an 800 Btu mixed gas. The paper is being printed in its entirety in two installments in American Gas Journal, Part 1 of which will be found beginning on page 35.

Another outstanding paper prepared by W. J. Lutz and J. H. Miller, of New-

Left to right: Frederic A. Hough, Los Angeles; Charles G. Young, Springfield, Mass.

ark, N. J. on dollar economics of gas main sizing also appears in this issue of the JOURNAL on page 16.

Special sessions during the convention included one on accident prevention, with W. H. Adams, chairman of the accident prevention committee of AGA presiding, and at which E. J. Boothby, Washington, H. A. Eddins, St. Louis, and A. V. Brashear were speakers.

It was brought out in the discussion that accident prevention should be broadened in scope to include customer safety, whereas in the past it has been limited to the problem of reducing employee accidents.

Home service was the subject of a breakfast meeting on Tuesday morning, and a round table discussion on the same afternoon, at both of which Vivian L. Marshall, New Orleans, chairman of the AGA home service committee, presided. In a panel discussion the home service women exchanged views on: home calls; audience demonstrations; club contacts; television; and selling and publicity procedures. Participating in the panel were: Irene L. Muntz, Rochester, who acted as moderator, assisted by Mary L. Bohn, St. Louis; Mildred Clark, Tulsa; Flora Dowler, Pittsburgh; Betty J. Frahm, Bismarck, N. D.; Julia Hunter, Dallas; Ruth Soule, Brooklyn, and Elyse VanDyke, Birmingham, Ala.

Other luncheon meetings included a corporate secretaries luncheon, B. H. Harper of Omaha, presiding; rate committee, under B. P. Dahlstrom, Newark, N. J.; personnel relations, Dwight S. Sargent, New York, chairman; and a joint luncheon of the industrial and commercial gas section and the residential gas section, with C. K. Lekberg, Hammond, Ind., and Carl H. Horne, New York, presiding jointly.

Annual Awards Presented At Convention

HIRAM J. CARSON, first vice-president, Northern Natural Gas Company, Omaha, Nebraska, has received the highest honor bestowed in the gas industry. He was awarded the American Gas Association Distinguished Service Award at the convention of the association held at St. Louis, Mo. The award is presented to the individual having made the most outstanding contribution to the advancement of the gas industry. The award comprises a certificate and a substantial cash gift.

Mr. Carson was cited for his outstanding contributions to the natural gas industry. His pioneering in dehydration, hydrogen sulphide removal and all-welded large diameter pipe line has been in no small way responsible for the growth and success of the industry. Application of his many accomplishments has materially benefitted the national welfare and represents an important contribution to the national defense and the American way of life.

Mr. Carson was graduated from Iowa State College with a BS degree in mechanical engineering. He first joined the utility industry as a cadet engineer with The Peoples Light Company at Davenport, Iowa. He went to Muscatine Lighting Company, Muscatine, Iowa, as assistant superintendent and later became general superintendent of the gas and electric company there.

He became general manager of the Cedar Rapids Gas Company and remained there, except for two years in military service in World War I, until he joined the Missouri Valley Pipe Line Company, now the Northern Natural Gas Company, in October 1930. He is now first vice-president of Northern Natural, and it was during his years of service here that he made the valuable contributions to the natural gas industry for which he has been cited and rewarded.

* * *

National recognition was bestowed on three gas utility companies for outstanding contributions to the progress of gas air conditioning at the convention. Winners of the fourth annual AGA Progress Award for Gas Summer Air Conditioning, sponsored by Servel, Inc., were Washington Gas Light Company, Washington, D. C.; The Ohio Fuel Gas Company, Columbus, Ohio; and the Council Bluffs Gas Company, Council Bluffs, Iowa.

First prize, consisting of $500 cash and a plaque, was awarded to the Washington Gas Light Company, for a complete and effective program on all phases of the sale and promotion and advertising of gas summer air conditioning. The Ohio Fuel Gas Company won second prize of $300 in cash for a complete and comprehensive sales planning program. The third prize, $200 in cash, went to the Council Bluffs Gas Company, for the excellence of organization of its sales and

NEW OFFICERS OF AMERICAN GAS ASS'N

Left to right: President George F. Mitchell, Chicago; First Vice-president Charles E. Bennett, Pittsburgh; Second Vice-president Earl H. Eacker, Boston.

AGA OFFICERS ELECTED FOR 1951-1952

PRESIDENT—George F. Mitchell, president, The Peoples Gas Light & Coke Co., Chicago
FIRST VICE-PRESIDENT—Charles E. Bennett, president, The Manufacturers Light & Heat Co., Pittsburgh
SECOND VICE-PRESIDENT—Earl H. Eacker, president, Boston Consolidated Gas Co., Boston
TREASURER—Edward F. Barrett, president, Long Island Lighting Company, Mineola, N. Y.

DIRECTORS

B. C. Adams, president, The Gas Service Co., Kansas City, Mo.
M. A. Abernathy, vice-president, United Gas Pipe Line Co., Shreveport, La.
L. L. Baxter, president, Arkansas Western Gas Co., Fayetteville, Arkansas
J. Theodore Wolfe, executive vice-president, Consolidated Gas Electric Light and Power Co. of Baltimore
Ralph L. Fletcher, president, Providence Gas Co., Providence
J. A. Fry, president, Detroit-Michigan Stove Co., Detroit
R. M. Heskett, president, Montana-Dakota Utilities Co., Minneapolis
E. G. Lawson, president, Pacific Public Service Co., San Francisco
Dean H. Mitchell, president, Northern Indiana Public Service Co., Hammond, Ind.
Louis Ruthenburg, chairman of board, Servel, Inc., Evansville
Earl Smith, president, South Jersey Gas Co., Atlantic City, N. J.
Paul R. Taylor, vice-president, Stone & Webster Service Corp., New York
Thomas Weir, vice-president and general manager, Union Gas Co. of Canada, Ltd., Ontario, Canada

AGA SECTION OFFICERS ELECTED

Accounting Section
Chairman—Ralph F. McGlone, Cleveland commercial mgr., The East Ohio Gas Company, Cleveland
Vice-chairman—Bernard S. Rodey, Jr., assistant secretary, Consolidated Edison Co. of New York
Industrial and Commercial Gas Section
Chairman—Ronald A. Malony, executive vice-president, The Bridgeport Gas Light Company
Vice-chairman—Terry Hart, general sales mgr., Nashville Gas & Heating Company, Nashville, Tenn.
Laboratories Managing Committee
Chairman—Arthur F. Bridge, president and general manager, Southern Counties Gas Company, Los Angeles
Vice-chairman—Charles E. Bennett, president, The Manufacturers Light & Heat Company, Pittsburgh
Manufacturers' Section
Chairman—Gordon Lefebvre, president, The Cooper-Bessemer Corporation, Mount Vernon, Ohio
Operating Section
Chairman—H. Bruce Andersen, vice-president, The Philadelphia Gas Works Company
Vice-chairman—Channing W. Wilson, research chemist, Consolidated Gas Electric Light and Power Co. of Baltimore
Publicity and Advertising Committee
Chairman—C. J. Allen, vice-president (retired), The Connecticut Light & Power Company, Waterbury, Conn.
Residential Gas Section
Chairman—William J. Schmidt, assistant vice-president and gen. sales mgr., Long Island Lighting Company, Mineola, N. Y.
Vice-chairman—Raymond J. Vandagriff, general sales manager, Laclede Gas Company, St. Louis

...THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

PAD OFFICIALS AT CONVENTION

Left to right: Charles E. Bennett, Pittsburgh; C. Pratt Rather, deputy administrator for gas, Petroleum Administration for Defense, Washington.

Left to right: Earl H. Eacker, Boston; Walter E. Caine, director, gas planning division, PAD, Washington.

service structure for gas summer air conditioning.

The jury of awards for the Servel-sponsored gas summer air conditioning contest was: John G. Belcher, publisher, *Progressive Architecture;* H. Leigh Whitelaw, managing director, Gas Appliance Manufacturers Association; Elliott Taylor, editor, AMERICAN GAS

(Continued on page 42)

Integration of Gas Fuel System Is Called Vital

OUTSTANDING in their long range implications for the future of the gas industry were the challenging ideas presented by Frederic O. Hess, retiring president of the Gas Appliance Manufacturers Association, who addressed a general session on the subject of industry research and long range planning. Prefacing his specific proposals, the speaker said in part:

We have built, and operate, the greatest fuel distribution system ever conceived . . . it has grown to such importance in our overall economy that we must further develop it . . . the gas industry has assumed a major responsibility for the operation of our economic system. . . . It obligates us to look beyond immediate needs, beyond present requirements . . . to further advance and improve.

We might well make an exhaustive study aimed towards integration of our gas fuel supply system . . . our various pipe lines interconnected to provide greater flexibility from Kansas City eastward.

We might explore and seriously investigate the possibility of auxiliary gas supply from the eastern half of the U. S. . . . to help our winter load problems, the industrial gas requirements, our combustion problems and our appliance and service situation. . . . We know that we do not have enough natural gas or natural gas lines in the east and north . . . we face the problem of disproportionate summer and winter load . . . of storage and of the burning characteristics of all the various mixed gases, oil gas and natural gas.

Suppose in strategic points of our integrated pipe line system, near our immense coal reserves, we were to construct large conversion and standby gas plants. These plants might be designed for the following functions:

1. To produce gas containing hydrogen to be mixed at all times with the natural gas in the pipe line system—to augment supply; improve burning characteristics; unify Btu content and combustion performance. We would distribute from Kansas City, east, a mixed gas, of, let us say, 800 Btu, containing 20 per cent hydrogen . . . thereby we could make really interchangeable standby gas, uniform from the Mississippi to the Atlantic seaboard.

2. These conversion plants would also provide standby capacity (of interchangeable gas) to keep up with demand and supply the increased winter load. This would maintain a 100 per cent load factor on the natural gas lines, the variations being taken up by the standby plants.

3. Excess plant capacity could be used for making gasoline during months when gas demand is low and gasoline requirements high.

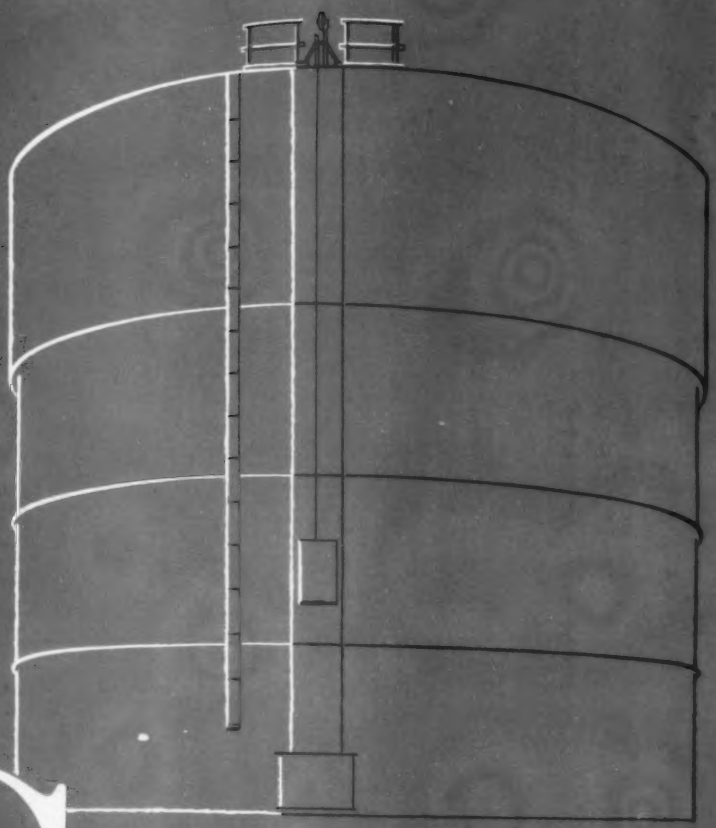
4. Oil could also be made during summer to serve as concentrated raw material and storage for winter peak standby demands.

The basic conception of the operation

(Continued on page 41)

12 COMPANIES WIN SERVEL TROPHIES

Shown are representatives of the winning companies who accepted the wall barometers awarded as trophies by Servel, Inc. Left to right: O. A. Barrett, Central Indiana Gas Co., Muncie; J. W. Owens, Central Florida Gas Corp., Winter Haven; S. S. Thomas, Natural Gas Co. of West Virginia, Pittsburgh; F. N. Seitz, Southern Counties Gas Co., Los Angeles; J. A. Reynolds, Brooklyn Union Gas Co.; R. J. Vandagriff, Laclede Gas Co., St. Louis; W. Paul Jones, president of Servel; W. L. Hutcheson, Manufacturers Light & Heat Co., Pittsburgh, chairman of the AGA Gas Refrigeration Committee; Frank H. Trembly, Jr., Philadelphia Gas Works Co.; G. F. Edwards, Atlanta Gas Light Co.; J. L. Hall, Southern California Gas Co., Los Angeles; C. L. Byers, Southern Union Gas Co., Dallas; and E. J. Prince, Chattanooga Gas Co. Frank S. Flesher accepted a trophy for Florida Public Utilities, West Palm Beach, but was not present when the photograph was taken at the AGA convention.



There is only one

MODERN

Gasholder

...that's the Wiggins—proved by 15 years of service

Many up to date plants, with last-minute equipment and an efficient operating organization, still use old-fashioned gasholders that require constant attention and present continuous hazards.

The WIGGINS modern gasholder cures all that. Actual operation for over 15 years proves that the WIGGINS functions with equal efficiency, come high water—hurricane or earthquake—winter or summer—any climate, anywhere.

The WIGGINS holds gas from foundation to roof—there's very little unused space. It can't blow out, leak, stretch or jam—and extreme temperatures make no difference in its operation. The WIGGINS is the simplest, safest, surest and most fool-proof gas-holding device yet developed.

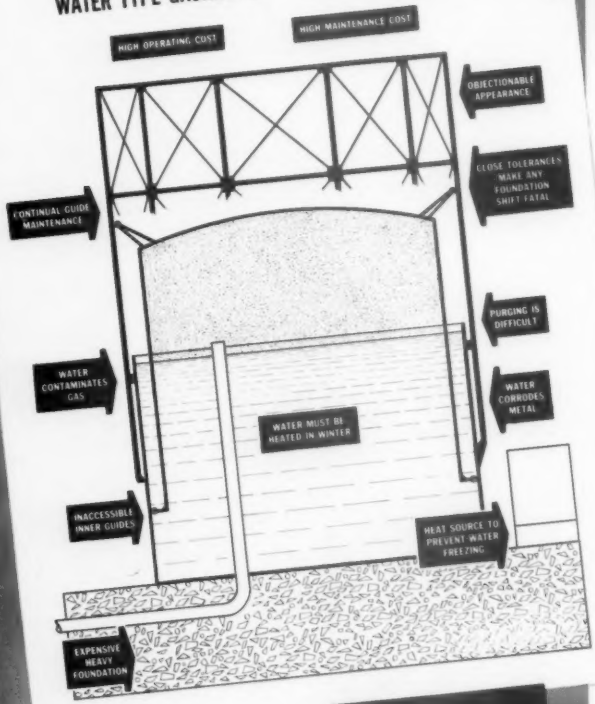
FOR MORE INFORMATION ON THE ONLY MODERN GASHOLDER, SEE NEXT PAGE

Wiggins... THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

THE WIGGINS SOLVES THE PROBLEMS CREATED BY OLD-FASHIONED GAS-HOLDING DEVICES...

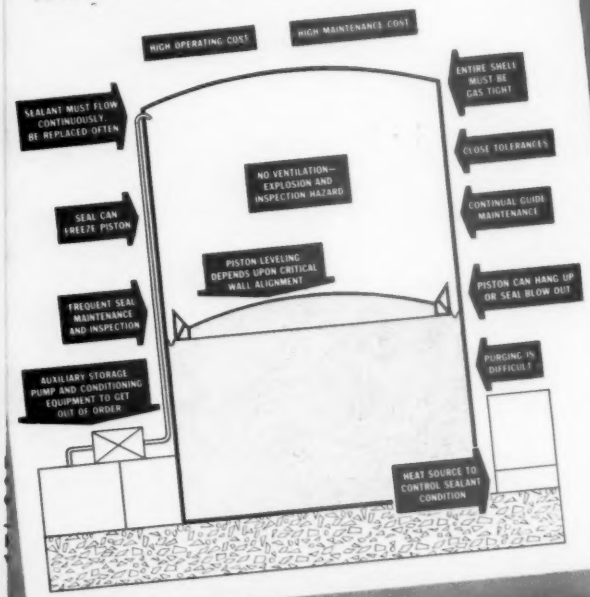
HAZARD CHART

WATER TYPE GASHOLDER



HAZARD CHART

PISTON TYPE WITH FLUID SEAL


HIGH OPERATING COST
HIGH MAINTENANCE COST
ENTIRE SHELL MUST BE GAS TIGHT
SEALANT MUST FLOW CONTINUOUSLY, BE REPLACED OFTEN
CLOSE TOLERANCES
NO VENTILATION—EXPLOSION AND INSPECTION HAZARD
CONTINUAL GUIDE MAINTENANCE
SEAL CAN FREEZE PISTON
PISTON LEVELING DEPENDS UPON CRITICAL WALL ALIGNMENT
PISTON CAN HANG UP OR SEAL BLOW OUT
FREQUENT SEAL MAINTENANCE AND INSPECTION
PURGING IS DIFFICULT
AUXILIARY STORAGE PUMP AND CONDITIONING EQUIPMENT TO GET OUT OF ORDER
HEAT SOURCE TO CONTROL SEALANT CONDITION

Wiggins

THE ONLY MODERN GASHOLDER

The heart of the WIGGINS gasholder is a chemically inert, virtually indestructible fabric. Tested for more than 15 years in actual use, it has shown no sign of deterioration or leakage. Installed in the gasholder, it is not exposed to friction or wear.

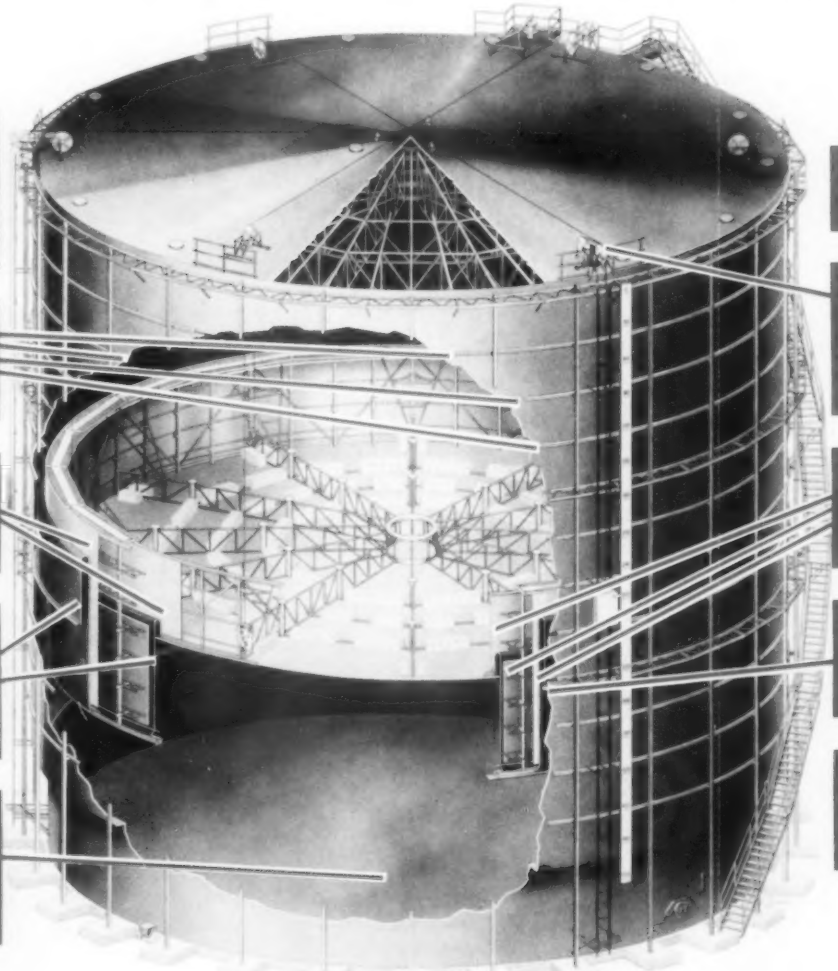
The WIGGINS is simple; no intricate moving parts—no guide rollers to get out of line, no close tolerances to jam up with ice or frost, no tracks to get out of alignment with settling foundations, and no sealant to require accessory equipment. Filling this gasholder is as easy and as direct as blowing up a paper sack—yet it is safer and surer than any other gasholder. Only the lower portion of the steel structure needs to be gas-tight—and the rest can be thoroughly ventilated. Inexpensive piers with a concrete ring wall make a secure foundation.

No wonder that the city of New York, for its new sewage-disposal system, chose WIGGINS; or that many chemical plants, tired of contaminated gas and constant care are adding WIGGINS gasholders or converting old-fashioned hazardous types to the WIGGINS with the virtually indestructible fabric heart. For full information, be sure to send the coupon.

EMPTY, showing top of piston and corrugated fender. Note weights on top of piston to regulate pressure.

. . . *easier* to erect. . . costs virtually *nothing* to maintain. . .

. . . gives *trouble-free* performance indefinitely



PISTON RISES NEARLY TO TOP—MINIMUM OF WASTE SPACE

TOP SECTION OF SHELL COMPLETELY VENTILATED

WIDE CLEARANCES SIMPLIFY OPERATION

GASTIGHT FRICTIONLESS SEAL NOT AFFECTED BY WEATHER

PISTON RESTS ON BOTTOM—LESS THAN ½ OF 1% FOR PURGING

CAN BE BUILT ANY SIZE

LEVELING DEVICE—INDEPENDENT OF SIDE WALL—KEEPS PISTON LEVEL

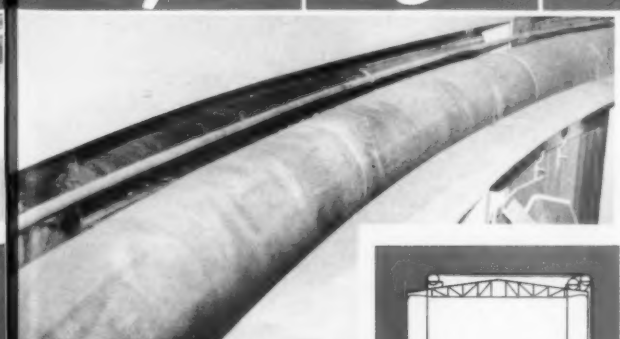
FENDERS PREVENT ALL TENSION IN SEAL

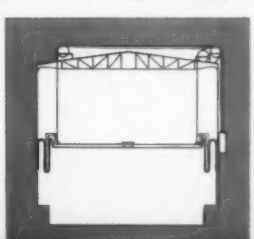
SHELL IS GASTIGHT UP TO SEAL CONNECTION

NO CONTAMINATION OF GAS

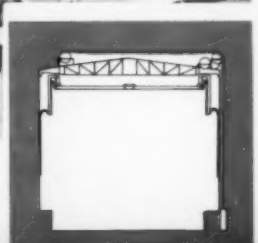
Wiggins...THE ONLY MODERN TROUBLE-FREE GASHOLDER FOR CHEMICAL PLANTS AND COMMUNITIES

4 FREEDOM FROM WEATHER HAZARDS | 5 CLEAN UNCONTAMINATED GAS | 6 CLOSE CONTROL OF GAS PRESSURE | 7 REDUCED ATMOSPHERIC CORROSION | 8 LOW COST OF OPERATIONS

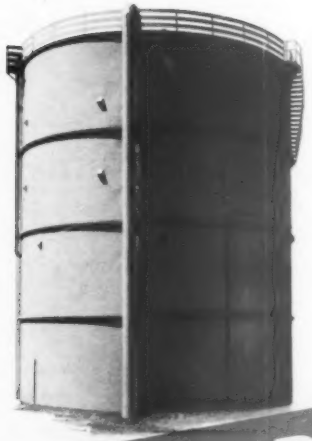




HALF FULL position, showing inflated seal constructed of Neoprene coated asbestos fabric.

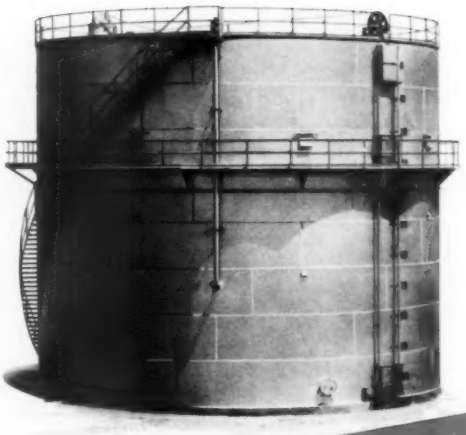


FULL position, view of mechanically operated relief valve. Releases gas if tank capacity is exceeded.



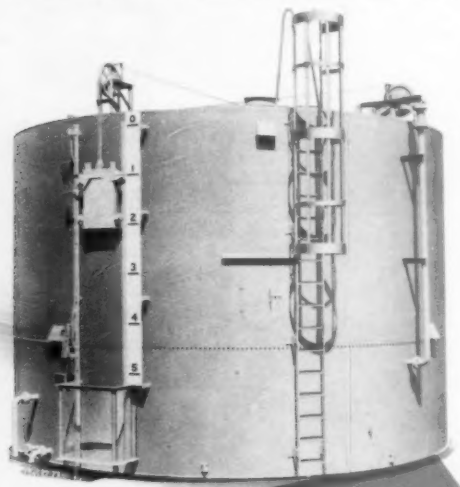
IN NEW YORK

New York City's newest and largest sewage disposal plant, at Owls Head, stores digestor gas in this 100,000 cu. ft. Wiggins holder.



IN LOS ANGELES

This 100,000 cu. ft. Wiggins gasholder stores digestor gas in the new $41,000,000 Hyperion Activated Sludge sewage disposal plant at Los Angeles.



IN CANADA

Canadian Liquid Air Company stores oxygen in this Wiggins holder—eliminating low temperature problems as well as ice and snow load difficulties.

IN NEW JERSEY

Pure Carbonic Company effects tremendous savings through conversion of this CO_2 holder from troublesome, expensive wet seal to trouble-free Wiggins.

General American Transportation Corp., 135 So. LaSalle St., Chicago 90, Ill.

Gentlemen:

☐ Please send me full information about the Wiggins Gasholder.
☐ Please have a representative get in touch with me.

I am interested in storing.....

Name.....

Firm.....Position.....

Address.....

City.....Zone.....State.....

Wiggins

THE ONLY MODERN GASHOLDER

WIGGINS VAPOR SEALS GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION

General Sales Office:

135 South LaSalle Street, Chicago 90, Illinois

Late Court Decisions Have Interest For Gas Companies

by Leo T. Parker

Attorney at Law, Cincinnati

MANY legal questions relate to gas explosions since damage liability from this source usually is extremely heavy when compared with ordinary liability. Another problem is knowing when a gas corporation may be compelled to extend its main to serve new areas. Late and leading higher court decisions on these points are given here.

Question No. 1: "What is the proper legal procedure to follow when a consumer reports a gas leak?"

The writer believes the best and most appropriate answer to this question is: A competent employe should be sent to the consumer's property to make a very careful inspection of the premises, appliances, and gas lines to determine the origin of the leak. However, a few late higher court decisions which establish interesting law will be reviewed.

According to a late higher court decision, a gas utility *never* is liable in damages for explosion of gas which leaked from a gas line owned and controlled by the consumer, if the testimony shows that the utility's employes did not on complaint of the property owner inspect the consumer's premises in view of locating the leak. The fact that the utility's employe was notified of the leak and *promised* to come and inspect the premises does *not* render the utility liable if actually he did not make the inspection.

For example, in Henderson et al. v. City of Cross Plains, 225 S. W. (2d) 936, the testimony showed facts as follows: A city owns a gas plant and furnished gas at one Henderson's house. Henderson had a gas meter installed by the city and the next day Henderson smelled gas, "whereupon he turned off all of the various connections and utilities in and about the house" and reported to the city that the odor of gas was in and about the house and requested the city "to inspect and make proper repair." Later the city employe who received this call testified that when he was notified of a leak in a line which belonged to the city he inspected it immediately; that it was not his duty to inspect lines owned by the consumer; that he told Henderson he would come to see him "when he got time" and that he did so as an accommodation to Henderson; and that in such cases he usually advised the consumer to get a plumber. The city employe did not come to Henderson's home to inspect the premises. The following day an explosion occurred when Henderson entered the front door of the living room and walked in with a flash light.

The testimony showed that the gas company's employes had only a few days previously installed a meter in Henderson's house and that he had at that time made competent tests and no gas was escaping from the meter or connecting gas lines. Actually the testimony showed that the explosion resulted from escape of gas from a gas line under Henderson's house and this line was owned by Henderson and under his control.

The higher court refused to hold the city liable for damage to Henderson's home, and said:

"It is evident from the record that gas did not escape from lines owned and controlled by the city but from those owned and controlled by the Hendersons. The record does not bring this case within those decisions which recognize the liability of a gas company for negligently failing to cut off gas running into a consumer's lines and keeping the gas cut off until the lines have been repaired, when the city has notice that gas is escaping from the consumer's lines."

Proximate Cause

On the other hand, if negligence of a gas corporation is the proximate cause of a gas explosion, the gas corporation is liable in consequential damages irrespective of intermediate causes. According to a late higher court decision the gas company is liable if after its employe completed installation work he failed to make efficient tests and know that no gas was escaping from *any* connecting gas lines.

For example, in Washington Gas Light Company v. Biancaniello, 183 Fed. (2d) 982, suit was filed against the Washington Gas Light Company to recover damages for wrongful death resulting from an explosion which occurred in the basement of a house during the laying down of a wood block flooring with a cement consisting of an inflammable mastic.

The higher court held that the evidence was sufficient to establish that the explosion resulted from gas vapors *rather* than mastic vapors and that the gas company's negligence was the proximate cause of the gas vapors. Hence the gas company was held liable in damages for death of the property owner. This decision was based on these facts: A gas

Robertshaw-Fulton Expands Plant Facilities

New building construction program has added 50,930 sq. ft. area to the Robertshaw Thermostat Division, Robertshaw-Fulton Controls Co., Youngwood, Pa.

The construction includes the addition of a second floor and a wing in the engineering building, a new building with 34,530 sq. ft. area for the manufacture of fuse boosters, a thermostat repair building with 5,160 sq. ft. area and a 60′ x 60′ extension to the Unitrol Building, increasing area of this building to 262′ x 60′. Engineering and fuse booster buildings are shown.

company's employe went to a private home to change a gas meter, the old one being removed because it was "aged in service." After replacing the old meter the employe examined the hand of the test dial on the new meter, and its movement indicated to him that there was a leakage somewhere in the system. He checked the appliances and found a leak at the main burner stop-cock of the water heater which he attempted to repair. But on again checking the test dial he found the hands still showing movement. A further check revealed a leak in an old gas range in the basement. He advised that the range be disconnected. He also discovered that the safety-pilot rod on the water heater was frozen and left a pink tag so stating. Another employe returned the next day to unfreeze the safety-pilot rod. He did this in the approved manner, but neither he nor the employe who came the first day rechecked the test dial.

The higher court held the gas company negligent and liable because when the installation was finished its employe had failed to check and re-check the test dial which at all times showed that a leak was somewhere either in the connecting gas lines or appliances in the home.

This court held that while the gas company's employe had no legal duty to repair appliances in the home, yet when once he assumed this obligation his negligence in completing the work inefficiently, and *not* checking the test dial, pipes and appliances until the dial showed no leak was such negligence that the gas company was liable for subsequent damage to the building caused by an explosion of gas.

Company Owns Service Lines

Question No. 2: "What is the legal responsibility of a gas company or city as to its own service pipes and mains?"

Modern higher courts consistently hold that a gas corporation is liable in damages for a gas explosion where "substantial proof" showed that the explosion resulted from failure of the officials and employes of the company to use "reasonable" care to make safe its own service lines, and also keep them safe.

For example, in Lovell et al. v. City of Las Cruces, 225 Pac. (2d) 143, the higher court held a city liable in heavy damages for a gas explosion because the facts and circumstances were such as to constitute substantial proof that the explosion was caused by natural gas which had escaped from a company's service pipe and diffused itself through soil to a point underneath a floor from where it found its way into the bedroom of a private house and exploded after a match was struck.

Further testimony showed that the gas company had complete control and management over the gas service pipe.

The higher court held that the gas company had a duty to use *reasonable care* to shut off gas at the curb or else disconnect the pipe at the main, or to inspect and care for the pipe and it was responsible to a person subsequently injured in explosion of gas escaping therefrom. The court said:

"The evidence shows that the defendant (gas company) installed the service pipe in question approximately ten years prior to the explosion; that it had complete management and control thereof; that the pipe was loose at the elbow where it formed an "L"; that a hole was discovered in the service pipe; that gas was escaping from the elbow and the hole; that when a match was applied to the pipe where the gas was leaking it would puff up, flare and ignite; that natural gas will diffuse itself along lines of least resistance."

For comparison see Castner v. Tacoma Gas & Fuel Company, 123 Wash. 236. In that case a dwelling house was demolished by an explosion. Gas had been installed in the house but the gas service was discontinued at which time the meter was removed. Gas was not ordered or used by the occupants of the house thereafter. In that case the service pipe extended under the ground from the main in the street and was brought to the surface of the ground under the house. The meter bar to which the meter was attached was installed under the corner of the property. When the meter was removed the gas was shut off ahead of the meter standard and not at the curb. The higher court held:

"A gas company is bound to inspect for discovery of leaks due to defects in material, deterioration of pipes and valves, displacement or dislocation by

(Continued on page 42)

Rockwell Dedicates New Plant At Tupelo, Miss.

At the recent dedication of Rockwell Mfg. Co.'s new plant in Tupelo, Miss., a number of top state officials were on hand to greet management people who came in from their Pittsburgh home office for the occasion. Left to right are Gov.-elect Hugh L. White, Governor Fielding Wright, H. Campbell Stukeman, vice-president, and Col. W. F. Rockwell, chairman of the board.

American Gas Fundamentals

OUTLINE

Natural Gas
- *Geology
- *Drilling and Completion

Manufactured Gases
- *Coke oven gas; producer gas, blue gas; carbureted water gas
- *Reformed gas
- *Hi-Btu oil gas

Basic Gas Laws
- Perfect Gases
- Supercompressibility

Transmission
- *Pipe lines
- Corrosion and pipe protection
- Compressor stations
- Hydrates and dehydration
- Gas conditioning
- Flow formulae
- Orifice meter measurement

Gas Storage
- *Methods of storing gas

Gas Distribution
- System design and operation
- *Pressure Regulation, Part 1
- *Pressure Regulation, Part 2
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Gas Distribution
- System design and operation
- Pressure regulation
- Measurement and accounting

Gas Utilization
- Combustion characteristics
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- Interchangeability

Conversion Practices

Management Problems and Policies
- Corporate structure
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American Gas Fundamentals *is a comprehensive compilation of basic gas facts to guide any gas utility employee toward a broader understanding of the industry as a whole. It is written in layman's language so that the technical fundamentals of every subject treated may be digested and understood by the non-technical reader.*

The series is designed to be removed from each current issue of American Gas Journal *and filed in a ring binder where it may be accumulated into a text book of permanent usefulness. Material should be filed under the major subject head appearing in the upper right hand box at the head of each chapter.*

Gas Conditioning

ALL natural gas flowing from wells contains one or more undesirable components which must be removed if the pipe line company is to have an uninterrupted source of marketable natural gas at the lowest possible cost. Removal of objectionable material, whether done mechanically, or chemically, or by adsorption, is generally known as gas conditioning.

The first and major reason for gas conditioning is to satisfy the customer, both domestic and wholesale. Large quantities of water or pipe line dust, and smaller amounts of obnoxious gases such as hydrogen sulphide are not conducive to good public relations.

The second reason for gas conditioning is to prevent formation of gas hydrate in high pressure transmission lines. The hydrate, which appears to be a hydrate of a mixture of the constituent gases, forms under pressure (at temperatures which may be considerably above 32 deg F) when intimate mixing of natural gas and condensed water take place. The hydrate is very porous and light weight, looking much like packed snow, and will accumulate to the extent of blocking the flow of gas in a transmission line.

Thirdly, the condensable hydrocarbons must be removed before they have reached a temperature low enough to condense into a liquid and thus reduce the effective gas capacity of the pipe. This reduction of cross-sectional area of the pipe may be small, yet it will materially increase the cost of transporting gas by increasing power requirements.

Methods

Gas conditioning is divided with respect to the elimination of undesirable characteristics into four classifications:

1. Water removal or dehydration
2. Removal of acid gases, both organic and inorganic
3. Condensable hydrocarbon recovery
4. Dirt and dust removal

Numerous methods have been employed in each of these classes. Only the most important are discussed here.

Water is always present in natural gas, sometimes in the vapor phase acting like the carrier gas, sometimes entrained in droplet form. The amount of water vapor a gas can carry depends upon its temperature and pressure. At any combination of temperature and pressure there is a maximum amount of water vapor which the gas can hold. If the temperature is lowered or the pressure raised slightly, all of the water vapor that the gas cannot hold condenses as droplets on any available surface. This saturation temperature at a specified pressure is known as "dew point."

In the gas industry, the term "dew point" depression is a measure of the reduction of moisture content of a gas and commonly used in relation to the merits of various dehydration methods.

For example a 40-deg F dew point depression below that of a gas saturated at 500 psig and 60-deg F means that after dehydration the dew point would be 20-deg F at 500 psig before any condensation of water vapor occurs. Under these conditions, approximately 24 lb of water for every million cubic feet of gas passed would be removed by the dehydration apparatus.

W. M. Deaton and E. M. Frost of the Bureau of Mines took advantage of this "dew point" phenomena in designing an instrument by which the "dew point" may be measured and absolute water vapor content determined from data obtained. This apparatus is described fully in the Bureau of Mines Report of Investigation, R. I. 3339. Gas under constant pressure is allowed to flow through the apparatus while the temperature is lowered slowly. At the "dew point" temperature the water vapor condenses on a mirror surface visible to the operator. When this condensation is observed both temperature and pressure are recorded. This method of measuring the water content of natural gas is almost universally used by gas companies.

Water Removal

Water vapor may be removed from a gas mechanically by raising the pressure and lowering the temperature. Cooling may be provided by low atmospheric temperatures during a portion of the year in the cooler climates. In milder climates and in summer, cool water or refrigeration may be used. Several disadvantages of this method of removing water prevent its use on a large scale. If mechanical refrigeration is required for dehydration only, the cost is excessive. Secondly, if dew points are lower than 32-deg F, ice forms in the system. This lowers efficiency and increases the possibility of plugging and stopping gas flow. Furthermore, the gas leaving the cooling system is in a saturated condition so that if it then encounters lower temperatures or higher pressures, more water will condense.

A cooling method whereby natural gas is expanded by reducing pressures of 2500-4000 psig to 500-1500 psig was described by F. C. Boston, United Gas Corp., at the American Gas Association Production-Chemical Conference, May 1951, in a paper entitled "Production of Marketable Natural Gas with Low Temperature Well Head Units." Consequent temperature reduction removes water in the form of hydrates which are removed by melting and trapping the liquids before they block the flow of gas. Source of heat for this purpose is the higher temperatures of the well-head stream.

Adsorbent Method

The second method of removing water vapor is to pass the gas through a solid adsorbent material or desiccant. The phenomena of adsorption of water in a solid desiccant occurs without chemical action and without intimate mix-

ing of the water and desiccant. The desiccant feels and appears dry even when saturated. The process depends on adhesion or molecular attraction between the water and the capillary structure within the solid material.

Dehydration equipment consists of a tower packed with a dry granular desiccant through which the gas passes downward. The desiccant bed progressively adsorbs moisture until it becomes saturated. It must then be reactivated. A second tower is provided to dry the gas during this reactivation period. To reactivate the desiccant a side stream of gas is heated and passed upward through the saturated desiccant bed. This removes accumulated moisture and hydrocarbons. The hot, wet gas then passes out of the top of the tower, is cooled, and passed through a separator where the condensate is removed. The gas is then returned to the main wet gas stream to be dehydrated.

The source of heat for reactivation gas may be direct fired heaters, Dowtherm vapor, or steam. Direct fired heaters are the least desirable because of the fire and explosion hazard and their inefficiency.

Two general classes of solid desiccants are commonly used by the natural gas industry: activated alumina and activated bauxite. A recent addition to the field is a solid material sold under the trade name S/V Sova Bead. Some of the solid adsorbents commonly used in other dehydration processes have not performed satisfactorily with natural gas because they are poisoned by heavy hydrocarbons or sulphur gases.

The solid desiccants give a dew point depression of 100-deg F and are applicable at pressures greater than 500 psig.

Chemical Removal of Water

The most commonly used desiccants for removing water chemically are diethylene glycol and triethylene glycol, both of which are hygroscopic; that is to say they have the ability to take up water. Calcium chloride brine which was formerly used quite extensively has been largely replaced because of its corrosive action. The glycol method is effective at pressures from atmospheric to 1500 psig and gives a dew point depression of 40 to 50 deg F. From this and previous statements it is obvious that both the chemical and adsorption systems have limited operating ranges but are competitive over a wide range which covers most natural gas operations. Therefore the choice of method depends upon economics and plans for future expansion.

A typical system for chemical removal of water consists of a scrubber, absorber tower, still column and reboiler along with suitable pumps, heat exchangers, and control instruments. Usually the inlet scrubber is contained in the lower portion of the absorber tower. Its purpose is to separate slugs of liquid or solids from the gas before it enters the absorber tower. If left in the gas this material would foul the bubble caps, solution lines, and control valves.

The absorber tower is usually a bubble tray type although in some smaller dehydration units packed towers may be employed. A liquid extractor is placed at the top of the tower to remove the bulk of liquid spray carried by the gas. This is backed up by a mist extractor, which is usually a layer of ceramic packing between screens. The combination of the two extractors minimizes liquid loss.

Tower operation is simple. Desiccant liquor is pumped into the top of the tower, flows across each tray and down a pipe to the next tray. As the gas rises through the tower, it flows through the bubble caps where it is broken into small bubbles and intimately contacts the liquor. One of the most important rules of tower operation is that after it has been inoperative for any period of time, or is being started, the liquid desiccant should be pumped through the tower at least 30 minutes before gas is allowed to flow. This is necessary in order to allow formation of a liquid seal at the base of a downcomer pipe, thus forcing gas to flow upward through the bubble caps.

If the seal is not made, gas will flow upward through the liquid downcomer pipe, thus preventing intimate contact of gas and desiccant liquor, and preventing effective dehydration.

The solution which has been diluted by water removed from the gas is collected in the bottom of the absorber tower where a liquid level controller adjusts the flow of dilute or lean solution to the reconcentrator still. After passing through a series of heat exchangers and sometimes a preheater, the lean solution is fed into a fractionating tower. In the stripping section of the tower (below the feed plate) water is stripped from the solution while in the fractionating section (above the feed plate) glycol is separated from the ascending water vapors and returned to the bottom of the tower. The necessary heat for tower operation is supplied by a reboiler which is usually located at the base of the column. The heating medium in the reboiler may be Dowtherm or a direct-fired immersion tube type heater may be used.

The concentrated solution is taken from the reboiler, passed through a series of heat exchangers to the suction of the solution pumps. Glycol is circulated by reciprocating piston or plunger type pumps. Centrifugal pumps are not suitable because high discharge head and low flow rate are required. Smoother operation results if the pumps are set for a constant rate of delivery, the maximum rate required. The excess flow is ample for periodic overloads.

A glycol dehydration system can readily be put into fully automatic operation and many units are so operated with only occasional attention.

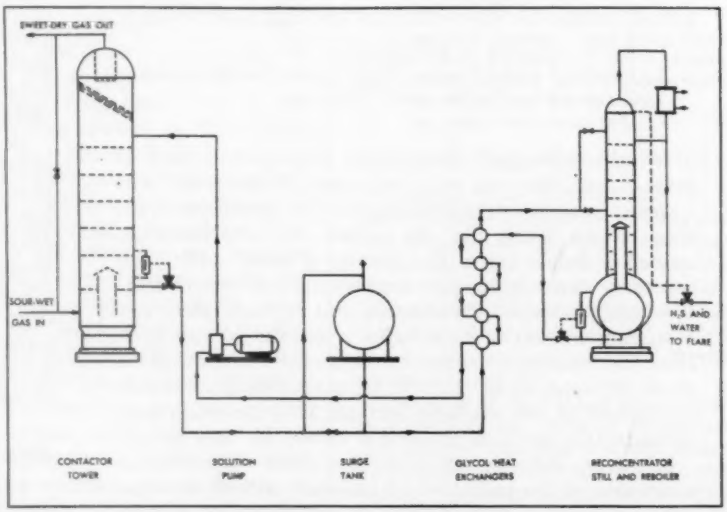

FIG. 1. TYPICAL DEHYDRATION AND SULPHUR REMOVAL PLANT USING DIETHLYENE GLYCOL AND DIETHANOL AMINE.

Sweetening of Sour Gas

The second phase of gas conditioning is the sweetening of sour gas or the removal of sulphur in its various forms along with carbon dioxide. Since carbon dioxide is usually removed with sulphur compounds, only the latter are mentioned in connection with the processes.

Sulphur is removed by several methods. Caustic soda and lime slurry processes are used for relatively small quantities of gas. The high cost of reagents and the problem of disposing of end products prevent their use when gas volumes are large.

Iron oxide is used most in the purification of manufactured gas but it can be used on natural gas if the volume is low and sulphur content is low. The iron oxide is used to impregnate wood chips and the combination is called "iron sponge." This material is placed on trays inside a contactor tower and kept damp. The gas temperature is held above 80 deg F to keep the bed functioning and to assure that all of the iron sponge enters the reaction.

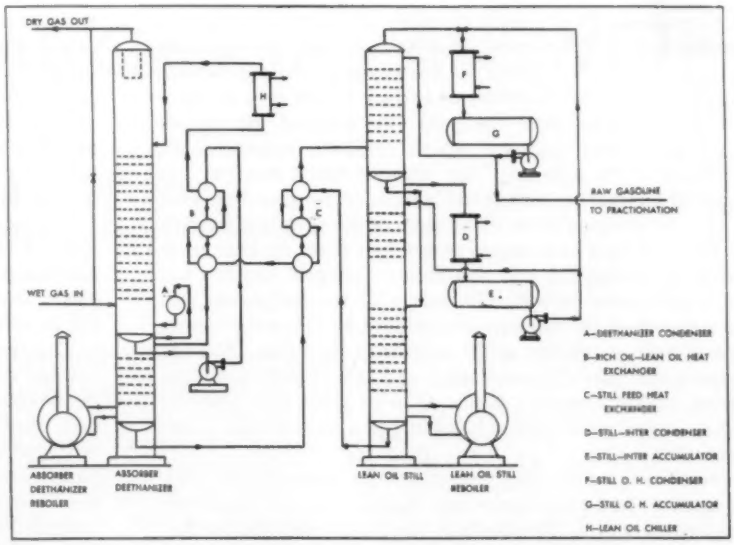

FIG. 2—HYDROCARBON RECOVERY PLANT.

When all of the iron sponge has been converted to iron sulphide, the material is removed from the reaction chamber and placed outdoors on a concrete slab where it regenerates, aided by occasionally turning the bed over with a fork. The regenerating mass is kept damp so that the heat of the reaction will not cause the shavings to burn. The disadvantages of this method are that it is a batch process and that the gas leaves the reaction chamber saturated at approximately 80 deg F.

Continuous Processes

Probably the first continuous process for removing sulphur made use of a solution of 2-3 per cent soda ash pumped through a bubble cap tower counter-current to the gas flow. During contact, soda ash forms a weak chemical combination with hydrogen sulphide. The combined solution is pumped to an aereating tower where it is subjected to a finely divided stream of heated air. This separates free sulphur and regenerates the original solution. Make-up solution must be added continuously in small amounts. Although sulphur is removed effectively, the treated gas is saturated with water vapor at whatever temperature the purification tower is operated.

In a second continuous process, sodium phenolate is used as the scrubbing medium. The hydrogen sulphide is driven from the scrubbing solution by steam. The steam is condensed leaving nearly pure hydrogen sulphide which can be burned for sulphuric acid. The process can be used satisfactorily on gases with high concentrations of hydrogen sulphide.

In the most used continuous process for removing sulphur, an organic base such as monoethanolamine or diethanolamine is used as the scrubbing medium. Heat is used to break the combination of hydrogen sulphide and the scrubbing medium. The pure hydrogen sulphide is then burned for sulphuric acid or sent to a flare.

The equipment is practically the same as in the glycol dehydration process and operating conditions differ only slightly. In fact, a combination of diethylene glycol and diethanol amine accomplishes both dehydration and sulphur removal in the same absorber tower, and the solutions are regenerated in the same still column and reboiler, as shown in Fig. 1.

Removal of Hydrocarbons

Natural gas is a mixture of hydrocarbons. Methane, ethane, propane, butane, pentane, and higher hydrocarbons are present in descending order of percentages. Water vapor, carbon dioxide, nitrogen, and hydrogen sulphide are present in small quantities. Under normal atmospheric conditions, however, no liquids will condense from natural gas.

As pressures increase and flowing temperatures drop, the higher hydrocarbons condense along with pentane, butane, and propane. The presence of these condensed liquid hydrocarbons, if produced in a natural gas transmission line, decrease the effective cross-sectional area of the pipe, thus increasing power costs for gas transmission.

In some instances, particularly when large volumes of gas rich in condensable hydrocarbons are handled by a gas company, it is practicable to erect plants to remove those for which there is a demand for special purposes, thus not only reducing power costs but also producing products that can be disposed of readily at a profit. Natural gasoline, propane and butane are the raw materials for other valuable chemical products such as butadiene for synthetic rubber as well as fuels for domestic consumption.

The first method of removing hydrocarbons was to compress the gas and cool it with cold water. Later an oil absorption process was developed in which towers filled with steel shavings and light mineral oil were used as absorbers. The gas passed upward through the tower where the gasoline fraction was removed. Steam was used to distill the gasoline from the oil.

A recovery process using activated charcoal as the absorbing medium was also developed. However, the most foolproof and efficient method is the continuous oil absorption process, as shown in Fig. 2.

Many improvements have been made in the oil absorp-

tion process. In a typical recovery plant rich feed gas is charged at the bottom of a bubble cap tower known as an absorber column where it encounters a down-flowing stream of lean oil sufficient to extract 70 per cent or more of the propane from the gas. The stripped gas passes through a mist extractor which removes entrained oil, and out to the pipe line. The oil with which this gas has been in contact collects in the bottom of the absorber. This rich oil is pumped from the bottom of the absorber through a series of heat exchangers in which it takes up heat from lean oil leaving the still and then is charged into the top of a deethanizer tower. The rich oil flows downward and is stripped of its methane and ethane by stripping vapors rising from a reboiler at the bottom of the tower. The hot vapors are partially condensed and mixed with feed gas going to the absorber. Since all wild gases are removed here, further stabilization of absorbed hydrocarbons is unnecessary.

Rich oil from the deethanizer bottom is pumped through a bank of heat exchangers and flashed into the rectifying section of a still. The flashed vapors are rectified to remove lean oil from the still overhead products. The liquid from the flash is drawn from the rectifying section and charged to the stripping section of the still, where a direct-fired heater is used as a reboiler.

All traces of hydrocarbons are removed from the oil in the stripping section, condensed and pumped as reflux and product, and mixed with still overhead vapors from the rectifying section. The rectifying section is operated at high pressure and the vapors do not need to be recompressed before condensation. The vapors are condensed and stored in an overhead accumulator. The vapor pressure of the product is about 160 psig and is ready for fractionation into propane, butane, and heavier hydrocarbons.

Dust Removal

One of the most troublesome problems in gas conditioning is dust removal. Dust is difficult to remove and costly in lost revenue, excessive repair bills, and customer good will. It has been estimated that dust can cause an error in orifice meter measurement of five per cent to 20 per cent by grinding off the sharp edges of the orifice plate. Reduction of this error requires frequent changing of plates and cleaning of orifice runs. Dust also erodes valves, regulator stems and valve seats. It fills pipe lines, reducing their capacity as much as 50 per cent, fouls domestic meters, and plugs burner orifices. Since most pipe line dust is approximately 70 per cent iron oxide, even small amounts cannot be tolerated in the direct fired processes of the glass, enameling, and other industries.

There are three types of scrubbers used for removing dust from natural gas: the screen or filter type, liquid washing type, and cyclone or centrifugal type. The screen type, as its name implies, consists of a vessel or an oversize section of pipe in which a filter made of fine mesh screen wire, glass wool, hogs hair, or cloth is placed. Dust that is left on the screen must be cleaned out when it increases the pressure drop excessively.

This type of filter is excellent when dust loading is low and flow is small. If the filter must be cleaned often, maintenance costs run high and duplicate scrubbers may be required during the cleaning period.

The liquid washing type scrubber operates continuously without requiring removal of accumulated dirt. The scrubber consists of a vertical cylindrical pressure vessel which can be divided into five separate sections depending on the job to be done.

The bottom section is the oil reservoir and sludge accumulator. The settled dust and dirty oil can be blown easily from this section, and an outside pressure storage tank permits fresh oil to flow back into the reservoir. The dirty gas inlet is also in this section. The inlet gas forces liquid down and then upwards through a contactor tube, the bottom end of which is a few inches into the oil. Oil and gas are intermixed in this contactor tube, which may be considered the heart of the cleaner, to provide thorough washing.

The third section of the scrubber is the expansion-separation chamber. After the gas and oil passes through the contactor tubes, it expands into the expansion-separation chamber where the particles of dust and oil drop out of the gas stream and is returned to the oil reservoir. The fourth and fifth sections are liquid entrainment separators which remove the balance of oil and oil mist from the clean gas stream.

The chief disadvantage of the liquid gas scrubber is its high initial cost. Slight oil carryover is experienced under design conditions and the unit is not capable of handling large overloads for even a short time without oil carryover. Under low load, good cleaning is not possible because of the lack of intermixing and washing.

The cyclone or centrifugal type scrubber takes advantage of the difference in weight of dust particles and the gas. Gas and dust enter a cylindrical tube tangentially and are given a circular motion while the gas changes its direction of flow from horizontal to vertically upward and out the top of the tube. The dust particles drop into a receiver at the bottom of the tube.

The advantages of this type of scrubber are its low initial cost, low installation cost and ease of maintenance. It can also take periodic overloads and low rates of flow without impairing efficiency.

These, then, are some of the conditions occurring in natural gas that sometimes require correction. Not all of them are likely to occur in any one supply of gas, but wherever they do occur, the methods of correction are well established and not too difficult of performance. There are, of course, many variations of the methods here described, but most of them are some variation of the fundamentals just reviewed.

This chapter on Gas Conditioning was prepared by Willis E. Muldrew, Process Engineer, The Manufacturers Light and Heat Company, Pittsburgh.

IS 100% NATURAL GAS THE ANSWER?

by E. G. Boyer
Philadelphia Electric Company

THE Philadelphia Electric Company, like many other manufactured gas companies, has experienced the swing to gas for house heating, and has had to do something about it. The swing raised a number of questions for which solutions had to be found, among which were: How and where are we to get enough gas to meet the peak loads? Shall we continue to distribute 520 Btu gas and add production equipment to make it? Shall we send out 100 per cent natural gas? Shall we adopt a mixed gas as the standard having a Btu between 520 and that of natural gas? What will be best?

After careful analysis of the factors involved, both economic and otherwise, our decision was to change to a new standard gas of 800 Btu and 0.58 specific gravity. The purpose of this paper is to present the sequence of the engineering steps by which this decision was reached for our situation.

This paper, by Mr. Boyer, was presented before the operating section of American Gas Association at its recent convention in St. Louis. The study is being presented in its entirety, in two installments, by AMERICAN GAS JOURNAL as a signal contribution to the technic of objective analysis which should precede any managerial decisions on the use of natural gas supply. The Philadelphia conclusions may not necessarily apply to other areas; but the method employed in arriving at those conclusions is worthy of universal adaptation.— The Editor.

Load Growth

In the Philadelphia Electric Company the swing to gas for house heating began about seven years ago. At the end of 1943 we had only 4,998 heating customers on the lines, for a saturation of only 3.4 per cent. At the end of 1950, there were 29,585 heating customers, giving an increase in heating customers of nearly 500 per cent in seven years, and a saturation increase of 509 per cent. The projection of this trend to the end of 1954 shows that the number of customers will be 48,210, and the saturation will be 656 per cent of what it was in 1943. Table 1 shows these data in columns 1 to 4, and columns 5 to 7 show comparative annual sales.

We are glad, of course, to have the customers come onto our lines. However, the large increase in sales occasioned by the new customers brings with it many problems prime of which is the question of how to meet the peak loads which will be encountered. Columns 8 to 10 of Table 1 show the maximum days for our case, both actual and estimated: if the 520 Btu standard were maintained, the maximum day would increase (by the end of 1954) nearly 300 per cent, with nearly 175 per cent increase over 1943 occurring in the four year period from 1951-1954.

Table 2 shows the classes of service which account for the large increase in total gas sendout from 1943 to 1954: house heating, 621 per cent; industrial, 162 per cent, and affiliated utilities, 73 per cent.

Plant Capacities

BEFORE RECEIPT OF NATURAL GAS

On the 520 Btu standard, and without natural gas, the gas available on peak days included purchased coke oven gas, our own production of producer gas, coke oven gas, reformed refinery gas, refinery oil gas, carburetted water gas, high Btu oil gas, and liquefied petroleum gas and air. The maximum that could be made available to maintain satisfactory appliance performance, without additional production equipment, was about 120,000 Mcf.

A comparison of this quantity to the maximum days in column 8 of Table 1 shows that our production equipment would have been sufficient up to and including only the year 1949. The same was true for the transmission and distribution systems, and the compressing equipment; they had just about reached the limit of their capacity.

What should be done? There was yet a large potential heating load in our territory, but how much could be added? Heating loads would mean greater peak loads, but the cost of peak gas produced from high priced fuels, plus investment charges for new equipment, would price us out of the competitive market. The answer was to either (a) refuse the additional load, or (b) find a lower priced fuel or method for producing peak gas.

AFTER RECEIPT OF NATURAL GAS

The answer came when natural gas was made available to our company through the Big-inch and Little-Big-inch lines from Texas, by the Texas Eastern Transmission Corporation. Some time later, Transcontinental Gas Pipe Line Corporation made gas available to our company through a new line to the eastern seaboard.

Studies were made to determine how natural gas could be used to the greatest advantage: how it could be used in production with little or no additional equipment; what its effect would be on plant capacities at different Btu contents; how much natural gas should be contracted for to effect economies of operation; and like questions.

The studies showed that with the present installed equipment with no major plant additions, and with an economic balance in the quantity of natural gas and other fuels, the maximum volume that could be produced at 520 Btu was about 160,000 Mcf; the maximum at 800 Btu would be about 175,000 Mcf.

There is not much difference between these two *volumes*, but the advantage of the higher Btu is obtained in the increased *thermal* content of the 175,000 Mcf at 800 Btu as compared to that of the 160,000 Mcf at 520. Table 3 summarizes this effect for several Btu con-

TABLE 1

GAS SENDOUTS, CUSTOMERS AND MAXIMUM DAYS, 1943-1954

Actual quantities are shown for 1943 to 1950, and forecasted quantities for 1951 to 1954

Year	Number of Customers: House Heating, Total as of Dec. 31 (See Note[1])	Number of Customers: House Heating, Percent increase over previous year	Number of Customers: Total—All Classes, Total as of Dec. 31	Number of Customers: Total—All Classes, Percent Increase	Annual Mcf of Gas Sendout: @ 520 Btu Standard	Annual Mcf of Gas Sendout: @ 800 Btu Standard	Annual Mcf of Gas Sendout: Percent Increase Previous Year	Mcf Sendout on Maximum Day: @ 520 Btu Standard Avg. Temp. 10° F (Note[5])	Mcf Sendout on Maximum Day: @ 800 Btu Standard Avg. Temp. 10° F	Mcf Sendout on Maximum Day: Percent Incr. Over Previous Year
Column No.	1	2	3	4	5	6	7	8	9	10
A.—Actual										
1943	4,998	—	147,364	—	13,785,500	—	—	60,000	—	—
1944	5,801	16.1	150,454	2.1	14,067,100	—	2.0	64,000	—	6.7
1945	7,082	22.1	152,187	1.2	14,364,900	—	2.1	68,600	—	7.2
1946	8,184	15.6	154,759	1.7	14,924,200	—	3.9	75,000	—	9.3
1947	10,754	31.4	158,361	2.3	17,013,000	—	14.0	81,500	—	8.7
1948	13,589	26.4	160,512	1.4	18,328,700	—	7.7	95,500	—	17.2
1949	21,579	58.8	166,066	3.5	19,109,300	—	4.3	114,700	—	20.1
1950	29,585	37.1	170,733	2.8	23,431,000	—	22.6	132,000	85,800[4]	15.1
Increase, 7 years (1950 over 1943)	24,587	491.9	23,369	15.9	9,645,500	—	70.0	72,000	—	120.0
B.—Forecasted										
1951	34,610	17.0	175,153	2.6	27,338,500[2]	17,770,000[3]	16.7	172,300[2]	112,000	30.5
1952	39,360	13.7	179,583	2.5	30,557,500	19,862,400	11.8	201,540[2]	131,000	17.0
1953	44,010	11.8	183,723	2.3	32,874,700	21,368,500	7.6	218,470[2]	142,000	8.4
1954	48,210	9.6	187,483	2.0	34,632,400	22,511,100	5.3	235,400[2]	153,000	7.7
Increase, 4 years compared to 1943	18,625	372.7	16,750	11.3	11,201,400	7,280,950	81.2	103,400	67,200	172.3
C.—Total increase 11 year period (1954 over 1943)	43,212	864.6	40,119	27.2	20,846,900		151.2	175,400		292.3%

[1]Saturation of heaters: 1943 = 3.4 percent; 1954 = 25.7 percent; increase in 11 years = 655.9 percent.
[2]Equivalent volumes of 800 Btu gas for January-June sendout at actual 520 Btu, plus estimated sendout for July-December at 800 Btu.
[3]Equivalent of the new standard 800 Btu gas volume; shown for comparative purposes only.
[4]Equivalent of the standard 520 Btu gas volume; shown for comparative purposes only.
[5]Estimation (1943-1950) of what the actual sendout would have been if the average temperature had been 10° F instead of what it actually was.

tents by showing their thermal content ratios and volumetric ratios compared to 520 Btu gas.

These show that the thermal content of one cubic foot of 800 Btu gas is 54 per cent greater than that for 520 Btu gas; therefore, 175,000 Mcf at 800 Btu is equivalent (thermally) to 270,000 Mcf of 520 Btu gas.

The extent of this advantage is determined by the extent to which the Btu are increased. Philadelphia Electric Company (for reasons discussed later) decided upon 800 Btu as its new standard. Columns 8-10 of Table 1 show the comparative effect of such a change in the volumes to be produced at 520 Btu and 800 Btu on the maximum day, and show that:

(a) With 520 Btu sendouts of 132,000 Mcf in 1950, and 172,300 Mcf in 1951, the maximum production capacity of 160,000 Mcf would not be sufficient for 1951. Additional plant would be required.

(b) With an 800 Btu sendout, the maximum production capacity of 175,000 Mcf will be sufficient through 1954. No additional plant will be required.

For 100 per cent natural gas, the effect would be greater. Then, perhaps, 100 per cent natural should be distributed in order to obtain the greatest thermal increase in the plant capacity. If this were the only consideration, 100 per cent natural would be the answer. But there are other factors that enter the problem and cause the question to be raised: *Is 100 Per Cent Natural Gas the Answer?*

On the basis of the decision reached for our situation, the company applied to the Federal Power Commission for permission to contract for the following quantities of natural gas:

(a) 20,000 Mcf per day from the Texas Eastern Transmission Corporation;

(b) 37,000 Mcf per day from the Transcontinental Gas Pipe Line Corporation.

Permission was granted by the Federal Power Commission and the contracts were signed for the total of 57,000 Mcf. The first gas was received from the Texas Eastern Transmission Corporation on September 17, 1948, and from the Transcontinental Gas Pipe Line Corporation on January 7, 1951.

Consideration of 100 Per Cent Natural Gas

ADVANTAGES

The advantages of distributing 100 per cent natural gas include:

a. It provides the maximum increase in the thermal capacity of the transmission and distribution system, and the compression equipment.

b. Requires minimum personnel for operating the handling stations.

c. Requires the minimum of plant equipment. If sufficient natural gas is available it might be possible to retire the old production plants. This reduces the capital investment and might permit a rate reduction to the customers.

d. The absence of impurities of a serious nature in natural gas makes it easy to use for the regulation of the quality of the gas produced. Automatically operated enriching controls work very well, resulting in a uniform heating value of the finished gas.

DISADVANTAGES

The disadvantages of supplying 100 per cent natural gas to the Philadelphia Electric Company territory include:

a. The company has contractual obligations for 17,500 Mcf of purchased coke oven gas which are effective until the end of 1954; and for refinery oil gas for an approximate maximum of 120,000 therms per day during the cold periods, and a minimum quantity, without "penalty charge," of 24,000 therms per day. Some use had to be found for these fuels.

b. The probability that additional natural gas would not be available to us when we would need it for increased loads. At the time the studies were made we had doubts as to how plentiful natural gas would be in the future. We did not feel that we should put all of our trust in a fuel over which we would have practically no control, and one that is

so thoroughly regulated by the Federal Power Commission and subject to its decisions for allocation of additional gas. Our doubts have been verified by recent developments. For example, Bruce K. Brown, deputy administrator of the Petroleum Administration for Defense, prepared an address for the 1951 Natural Gas Convention and said: "Because of increasing demands for natural gas and the decreasing supply of materials with which to construct facilities to transmit it, the country now faces the unfortunate prospect that this vital fuel is likely to be in extremely short supply next winter and in the next few years. It may be expected that shortages will occur in a number of important industrial centers."

Further: at the beginning of the study of our problem, the management of our company made it very clear that no matter what the new standard would be, our present policy must be adhered to. This policy is that service continuity must be provided at all times; that no curtailment of service will be tolerated because of insufficient gas supply due to either the failure of a natural gas main, or curtailment of natural gas supply to our company; or lack of availability of natural gas for future load growth; or for lack of any facilities for producing peak requirements.

These developments might have been sufficient by themselves to eliminate 100 per cent natural gas from consideration, but there were others.

c. The difficulty of producing a satisfactory substitute or supplemental gas for natural gas: to date, high Btu oil gas and LP-air seem to be the only practical ones to consider.

LP-air is acceptable usually at Btu contents some 20 per cent to 40 per cent higher than the 1,000 Btu natural gas. Further, it requires comparatively large investment for sufficient storage capacity. And, too, there is no assurance of an adequate supply of LP whenever it is needed; rather, just the opposite.

High Btu gas is acceptable under certain conditions. Unscrubbed, it can be used in concentrations of only 50 per cent-70 per cent in mixture with natural gas. If it is scrubbed of its benzols, it is used in place of natural gas. In any event, an investment is required for plant additions and changes, which tends to offset the financial and operating advantages gained by adopting 100 per cent natural gas as the new standard. In our company, with two suppliers of natural gas, an interruption in one supply might not be too serious; but in companies where entire dependence is upon one supplier, and/or upon one supply main, it would seem that a 100 per cent acceptable substitute gas is a requisite—but where *is* an economically and practically satisfactory substitute?

TABLE 2
GAS SALES, BY CLASSES OF SERVICE, AND GAS SENDOUTS FOR YEARS 1943 AND 1945
MCF

	Mcf at 520 Btu		*Mcf at 800 Btu*		*Percent Incr. over 1943*
	1943	*1954*[1]	*1943*[2]	*1954*	
Column	*1*	*2*	*3*	*4*	*5*
A—Gas Sales					
1. Phila. Elec. Co. Customers					
Domestic	3,422,030	3,972,920	2,224,320	2,582,400	16.1
House Heating	1,943,980	14,022,770	1,263,590	9,114,800	621.3
Commercial	1,291,150	1,200,310	839,240	780,200	—7.0
Industrial	2,649,830	6,954,000	1,722,390	4,520,100	162.4
Interdepartmental	68,430	60,000	44,480	39,000	—12.3
Total PE Co. Only	9,375,420	26,210,000	6,094,020	17,036,500	179.6
2. Affiliated Utilities	3,596,650	6,220,740	2,337,830	4,043,500	73.0
3. Total Gas Sales	12,972,070	32,430,740	8,431,850	21,080,000	150.0
B—Used in Gas Plants	28,530	192,310	18,550	125,000	573.9
C—Total Accounted-for Gas	13,000,600	32,623,050	8,450,400	21,205,000	150.9
D—Losses	784,900	2,009,350	510,200	1,306,100	156.0
E—Total Gas Sendout	13,785,500	34,632,400	8,960,600	22,511,100	151.2

[1]1954 Volumes will be actually at 800 Btu. They are restated here as equivalent volumes of 520 Btu gas for comparative purposes only.
[2]1943 Volumes were actually at 520 Btu. They are restated here as equivalent volumes of 800 Btu gas for comparative purposes only.

TABLE 3
THERMAL AND VOLUMETRIC RATIOS FOR VARIOUS BTU CONTENTS OF GAS, COMPARED TO ONE CUBIC FOOT OF GAS AT 520 BTU

1. Btu of sendout gas	520	600	700	800	900	1000
2. Thermal content ratio	1.0	1.15	1.35	1.54	1.73	1.92
3. Volumetric ratio	1.0	0.87	0.74	0.65	0.58	0.52

TABLE 4
EFFECT UPON THE AVERAGE COST OF NATURAL GAS CAUSED BY THE LOAD FACTOR PROVISION IN THE CONTRACTS

	Texas Eastern			*Transcontinental*	
(a) *Load Factors*					
Period Basis	Monthly	Monthly	Monthly	Annual	Annual
Contract Minimum	50%	50%	50%	65%	65%
Actual daily average	100%	75%	50%	100%	65%
(b) *Quantities*—Therms					
Contract					
Daily Minimum	200,000	200,000	200,000	370,000	370,000
Daily Minimum	100,000	100,000	100,000	240,500	240,500
Period Minimum	3,000,000	3,000,000	3,000,000	87,782,500	87,782,500
Used					
Daily Average	200,000	130,000	100,000	370,000	240,500
Period Total	6,000,000	3,900,000	3,000,000	135,050,000	87,782,500
(c) *Charges*					
Demand	$ 40,000	$ 40,000	$ 40,000	$ 932,400	$ 932,400
Commodity	126,000	81,900	63,000	2,836,050	1,843,430
Total	$ 166,000	$ 121,900	$ 103,000	$ 3,768,450	$ 2,775,830
Aver. c per therm used	2.77c	3.13c	3.43c	2.79c	3.16c

d. The comparatively high cost of natural gas when used at a low load factor is a serious disadvantage.

Our contracts for natural gas contain two components of cost, which are (1) the demand charge and (2) the commodity charge. The total payment under the commodity charge is subject to modification by (3) certain minimum take-or-pay for provisions.

(1) The *demand charge* is a flat charge per Mcf of the daily contracted for quantity, payable monthly. The demand charges payable by Philadelphia Electric Company per month are:

Texas Eastern =
$2.00 per M x 20,000 M = $40,000
Transcontinental =
$2.10 per M x 37,000 M = $77,700

(2) The *commodity charge* is based on a stipulated cents per therm for each

NATURE PROVIDES PIPE COVERING

A freak of nature has been reported by the United Natural Gas Company of Oil City, Penna.

The unusual sight of a pipe line passing through a growing tree may be seen in Pinegrove Township on a tract of land known as the Powell farm which is owned by The Mars Company, a United Natural affiliate. The location is near Powell's Corners on the old state road to Fryburg.

The pipe line, three inches in diameter, connects a United Natural well to the company's gathering system. The well was drilled in March 1890. The exact date the line was laid is not known.

In the early days of the company it was the general practice to lay gathering lines on top of the ground except when fields were cultivated; also to follow the shortest route from well to a main artery. This practice is clearly illustrated in the picture of the pipe line passing over a large boulder and then through the tree before it drops to the ground.

It is assumed the tree was a sapling

Who's doing what to whom?

touching or standing close to the line when it was laid. Expansion and contraction of the metal resulted in the line moving against the tree causing a wound, normal healing of which was prevented by pressure of the pipe against the tree. Eventually, the tree's growth encircled the pipe line.

The company estimates that the tree, a white oak, is at least 80 years old.

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therm of gas received, and as modified by the "minimum take-or-pay-for" provisions of the contract. Our contracts with the two supplying companies specify a commodity charge of 2.1 cents per therm.

(3) The *minimum take-or-pay-for* provision requires that the company must either take or pay for a specified minimum daily average quantity of natural gas, either on a monthly or on an annual basis. The daily average quantity is referred to as a percentage of the daily contract quantity. The percentage is called the *load factor*.

In our contract with Texas Eastern, the minimum take-or-pay-for provision is based on a *monthly* load factor of 50 per cent. That is: With our contract of 20,000 Mcf (or 200,000 therms) per day, we must take-or-pay-for a daily average during the month of 200,000 therms x 0.50 (load factor) = 100,000 therms. If the quantity actually taken during the *month* averages, say, only 80,000 therms per day we must pay for 100,000 therms per day.

In our contract with Transcontinental, the load-factor provision is for 65 per cent of the daily contract quantity, on an *annual* basis. That is: with our contract of 37,000 Mcf (370,000 therms) per day, we must take-or-pay-for 370,000 x 0.65 = 240,500 therms per day average during the year. If the quantity actually taken during the *year* averages, say, only 200,000 therms per day, we must pay for the 240,500 therms per day.

The effect of these provisions is shown in Table 4. These examples show how the cost of natural gas can vary. It is most important, therefore, that the proper balance be determined between the quantity of natural gas to be contracted for and the daily sendouts to be encountered. This can be done only by detailed and thorough studies including all practical and probable conditions that are foreseeable for the future.

e. The high cost of natural gas for peak sendout is a serious disadvantage. In our situation we require peak gas on 25 days when the present contract quantity of 57,000 Mcf is insufficient. If we should contract for sufficient natural gas to meet the top peaks, the cost of that gas would be prohibitive.

For example: On February 8, 1951, the sendout was 155,760 Mcf of 520 Btu gas, or 809,950 therms. Of this, 39,700 Mcf, or 397,000 therms, was natural gas.

If the sendout had been 100 per cent natural gas, we would have required 412,950 therms (41,295 Mcf) more of natural gas, theoretically. This amount would have had to be under contract, so its cost would have been:

Demand charge	
41,295 Mcf × $2.00/M × 12 Months =	$ 991,080
Commodity charge	
Therms used = 412,950 × 25 days = 10,323,750 therms	
Minimum take-or-pay-for therms = 412,950 × 365 days × 0.50 load factor = 75,363,375 therms × 2.1¢/therm =	1,582,630
Total charges	$2,573,710
Average cents per therm *used*	24.93¢

This price is much higher than that for LP gas or high Btu gas, or carburetted water gas, which are the usual peak load gases. Therefore, it does not appear to be economically sound to contract for enough natural gas to supply the entire demand on peak days, when the contract contains the demand and/or the minimum take-or-pay-for provision.

f. The slow burning characteristics of natural gas compared to manufactured gas present some problems which are not easily overcome. Some industrial applications can tolerate only slight variations in heat input to their burners, and consequently it is difficult to burn the slower burning gas and maintain uniform production. A condition of this sort can usually be overcome by the use of better or larger burners. The manufacture of a gas that will completely substitute for natural gas is at present not economically possible. All manufactured gases burn faster than natural gas, and some may give yellow tip difficulties. However, reasonably large percentages of manufactured supplemental gases can be used without having a serious effect on appliance operation.

g. The cost of converting production plants to produce high Btu gas, or the installation of large quantities of LP gas:

To install sufficient capacity to supply the necessary emergency gas in case of an interruption in the natural gas supply would seem to be unsound economically at today's construction costs. It seems better to arrive at some combination of present production methods and natural gas, with a minimum of plant changes that will permit the production of substitute gases in emergencies.

h. Production plants might have to be removed from the rate base when natural gas comes in and production plants are not usable any longer. Utility commissions do not usually look with favor on the continuing of the value of such plants in the rate base, so they might have to be retired. This might not always be economically desirable or sound.

i. The cost of converting appliances to 100 per cent natural gas might be considerable. When changing from manufactured gas to natural gas appliances must be changed generally. Burner ports must be drilled, or heads changed. At lower Btu's and with some high hydro-

(Continued on page 50)

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go Rockwell all the way!

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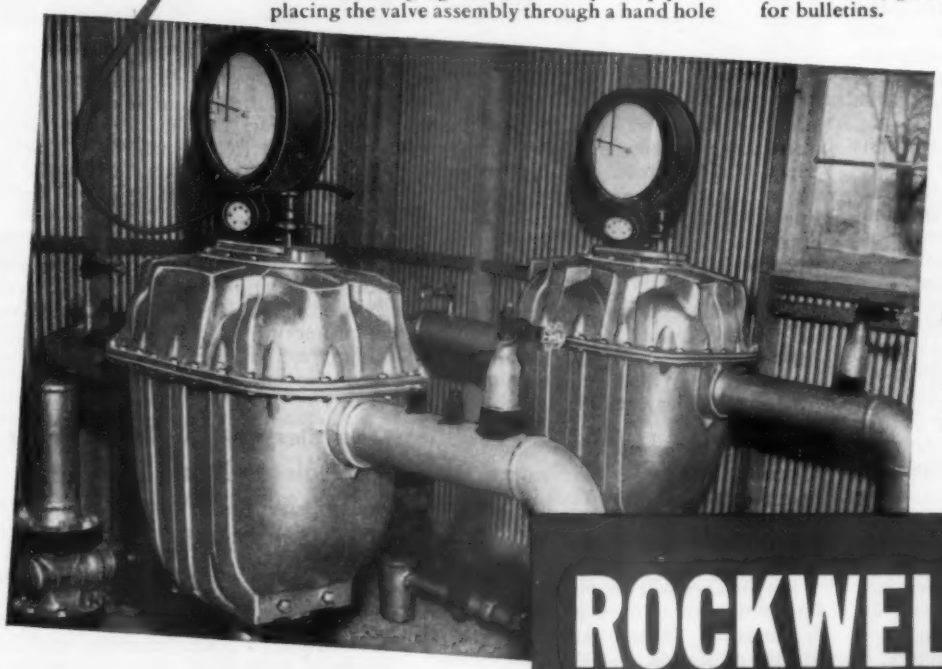

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News of the Gas Industry

Commonwealth Services Enters Gas Conversion Field

W. B. Tippy

Commonwealth Services Inc., management and engineering consulting firm, has announced the incorporation of a subsidiary, Commonwealth Gas Conversions, Inc., to serve operating gas utilities in converting appliances for the use of natural gas or high Btu manufactured gas.

William B. Tippy, vice-president and director of Commonwealth Services, is president of the new campany. Field work is being conducted under the direction of Cletus B. Farrell, general manager, and Howard E. Wallis, chief field engineer, both with long experience in the gas conversion field.

Commonwealth Gas Conversions, by agreement with Gas Construction & Service Company, is taking over all field conversion services previously rendered by the latter organization.

The new company is now engaged in conversion work for several gas utilities in the New England area. Commonwealth will supply complete conversion services including engineering studies and advice, sectionalizing of service area, publicity, customer and public relations programs in connection with the changeover, training of clients' staffs, and actual field conversion work. Commonwealth also offers, through the service company, studies for rate adjustments, peak shaving, stand-by and storage facilities, financial advice, distribution system studies and recommendations for manufacture and use of substitute and supplemental high Btu gases in conjunction with natural gas.

Joseph L. Kiraly Has Joined American Meter

American Meter Company has announced the appointment of Joseph L. Kiraly as assistant to the vice-president in charge of production. Mr. Kiraly attended Fenn College and was graduated with the degree of industrial engineer.

Prior to his association with American Meter, Mr. Kiraly was with Stevenson, Jordan and Harrison, management consultants, New York, for nine years.

Ancient Supplers Hold Annual Wassail At AGA Convention

Five of the "Original Thirteen" who founded the Gild in 1937: Joseph A. Messenger, C. Edwin Bartlett, William S. Guitteau, H. Leigh Whitelaw, Joe A. Mulcare.

Mob scene of 1951 Wassail at St. Louis.

STEPHEN D. DAY, president of the S. D. Day Co., Houston, Tex., was elected Mayor of the Gild of Ancient Supplers at its annual meeting held Oct. 15 at the Missouri Athletic Club, St. Louis. He succeeds E. Carl Sorby, vice-president of the Geo. D. Roper Corp., Rockford, Ill., who was Mayor for the last two years.

Other officers chosen by the Gild are: Senior Warden, George P. Velte, American Stove Co., Long Island City, N. Y.; Clerk, William G. Hamilton, Jr., American Meter Co., Philadelphia, Pa.; Keeper-of-the-Treasure, Glenn H. Niles consulting engineer, Ridgewood, N. J.; Aldermen, Joseph A. Messenger, Buell Engineering Co., New York City; Frank C. Packer, Payne Furnace Co., Beverly Hills, Calif.; and Louis Ruthenburg, Servel, Inc., Evansville, Ind.

Mayor Day will announce in the near future his appointments of regional Wardens, a Sergeant-at-Arms, and a Master of Revels.

The business meeting was followed by the annual Wassail, a traditional feature held the first evening of American Gas Association conventions. Some 300 Supplers and Burghers united in enjoying a buffet supper; Burghers are gas utility men invited to join with the Supplers once a year. The Wassail was under the direction of Master of Revels Alvin M. Stock.

The Gild is composed of some 200 supplers "of gas appliances, skills, gins, accessories and substances" and was organized in 1937 with the basic purposes of promoting the use of gas and maintaining a high level of integrity among men who serve the gas industry.

Peoples Natural Names Maust Dealer Relations Supervisor

Arthur A. Maust has been appointed dealer relations supervisor of The Peoples Natural Gas Company's sales division, it is announced by Christy Payne, Jr., vice-president.

Mr. Maust, who will have charge of the company's dealer relations staff and program throughout Western Pennsylvania, succeeded Paul E. Beech, who recently accepted a position with the A. O. Smith Corporation as factory representative in charge of sales in a four state area.

Arthur L. Smyly, of Connelly, Is Dead

Arthur L. Smyly, president, Connelly, Inc. died on October 16 following a brief illness. Mr. Smyly had been connected with the firm for 45 years.

He was born in Garvagh, County Derry, Ireland, and went to the West Indies as a young man to enter the coffee industry. He came to the United States in 1905 and after a brief period with Westinghouse Electric Company joined the Connelly organization. In 1932 Mr. Smyly became the principal owner of the company and assumed the position of president.

Under his direction the company enjoyed a period of expansion and during the war earned commendations for its part in supplying the special needs of the original atomic project and in the synthetic rubber program.

NY State & Peoples Natural Make Personnel Changes

John W. Hendrickson, has been appointed technical assistant to the superintendent of production and transmission for New York State Natural Gas Corporation, Pittsburgh, it is announced by E. M. Borger, president.

Mr. Hendrickson, a graduate of Wooster College, Ohio, has been associated with the geological departments of New York State Natural and The Peoples Natural Gas Company for several years.

Donald L. Barger has been appointed assistant superintendent of production and transmission for New York State Natural Gas Corporation.

Mr. Barger, formerly Armstrong district superintendent of The Peoples Natural Gas Company, started with Peoples in September, 1935, in Monongahela City. He became a junior civil engineer in March, 1944, and served as assistant superintendent in Armstrong district until 1948, when he was made superintendent in the area.

Mr. Barger will assist Edward C. Inghram, New York State Natural's superintendent of production and transmission, in his new assignment.

William A. Boyd has been appointed head of New York State Natural Gas Corporation's gas measurement accounting department, and Raymond C. Yeckley has been promoted to assistant department head of a similar department for The Peoples Natural Gas Company.

D. K. Taylor Is Western Mgr. For Connelly, Inc.

D. K. Taylor, formerly in charge of Chicago operations and sales has been appointed manager, western division, of Connelly, Inc., comprising operations in Chicago and Los Angeles with headquarters in Chicago.

J. L. Ruziska will continue as manager of the eastern division with headquarters in Elizabeth, N. J.

Ray F. DeVaney Is Promoted By South Wind, Stewart-Warner

Ray F. DeVaney

Appointment of Ray F. DeVaney as sales manager of domestic heating equipment of the South Wind division of Stewart-Warner Corporation, has been announced by W. E. Judd, general sales manager of the division at Indianapolis.

Mr. DeVaney, for the past three years factory representative in California and Nevada, with headquarters at Los Angeles, has been in the sales department of the South Wind division for eight years. He was formerly in charge of national accounts sales of South Wind car heaters. His appointment fills the vacancy created by the resignation of H. W. Milner which became effective October 31.

In his new position Mr. DeVaney will direct sales operations through a national distributing organization for the "Safety-Sealed" line of gas-burning domestic heating equipment manufactured by Stewart-Warner. He is 46, a native of Indiana, and was graduated from Wabash College in 1929.

AO Smith Distributor Sponsors Tom Harmon Football Forecast

Tom Harmon, former University of Michigan All-American halfback, has joined the A. O. Smith Permaglas team. Mell O. Haldeman Corp., southern California A. O. Smith water heater distributor, is sponsoring Harmon's television football forecast through the 1951 season on KTSL, Los Angeles. Present as contract was signed were: seated, left to right, Jack Manildi, president of Mell O. Haldeman; Tom Harmon; H. L. Bilsborough of A. O. Smith: standing, George Souther, heating division sales manager for Haldeman; H. F. Jacobsmeyer of A. O. Smith.

British Columbia Electric Granted Gas Rate Increase

Gas rates for the greater Vancouver area of British Columbia have been increased by from five to 17 per cent, as the result of approval granted by the British Columbia Public Utilities Commission. All increases asked by the B. C. Electric Company were approved.

J. H. Miracle and B. H. Winham Promoted by United Gas

J. H. Miracle, former secretary of United Gas Corporation, has been elected a vice-president, and B. H. Winham, assistant to the president, has been elected secretary.

N. C. McGowen, United Gas president, announced the changes following a recent meeting of the firm's board of directors.

Mr. Miracle, a native of Arkansas, has worked in the oil and gas business for more than 30 years and has been in the United Gas organization since 1931. He was elected secretary of United's subsidiaries in 1937 and became secretary of the corporation in 1946.

Mr. Winham, who is assistant secretary of two United subsidiaries, United Gas Pipe Line Company and Union Producing Company, joined the organization over 20 years ago and was named assistant to the president in 1947.

Integration of Gas Fuel

(Continued from page 24)

is not more local plants or facilities, but more in the order of statewide transformer and generating stations. The utilities would still buy metered gas from pipe lines just as they do now, that principle having been established and legally accepted.

Such conversion plants could make hundreds of other valuable chemical materials . . . which would assist in paying for the overall operation. They would be assured year round operation, not being single purpose conversion plants.

Fantastic? No more than our fuel distribution of today was 25 years ago. Costly? Every major pipe line costs from $100 to over $200 million and has its amortization, operating and compression costs. Risky? Does not our ten billion dollar industry justify risk, can we answer our pressing industry problems without taking risks?

The fundamental question of economic feasibility can only be answered through coordinated research . . . it would require the cooperative efforts of experts in the fields of gas making, of coal hydrogenation, chemistry, coal mining, and the oil industry. We have such experts. Such a study would involve time and money; but would not a few hundred thousand dollars expended in such research be a worthwhile investment? And if such a study should result in a favorable report, can we doubt our ability to finance the projects or to operate them?

Research of major proportions is a fundamental need of our industry—re-

search which keeps pace with the financial investments and the fuel system these huge investments have already begun to create . . . let us attract engineers and scientists to our gas industry by challenging projections of future growth and expansion through research.

AGA Convention

(Continued from page 24)

JOURNAL; and H. P. Morehouse, assistant sales manager—gas, Public Service Electric and Gas Company, Newark, New Jersey. John Gilbreath, assistant vice-president, Servel, Inc., served as an advisory member on the committee.

Outstanding achievements in promoting and maintaining consumer demand for gas house heating were recognized at the convention. Two gas utility men were awarded cash prizes and certificates for their contributions to the advancement of gas house heating during the past year. This was the fifth annual AGA Gas House Heating Award sponsored by the Coroaire Heater Corporation.

H. F. Carr, assistant manager, appliance and residential sales, Consolidated Gas Electric Light and Power Company of Baltimore, Maryland, was awarded first prize of $500 for the development of a sales promotion and advertising program for gas house heating sales. This program substantially increased gas house heating customers in the face of an intensive campaign launched by competitive fuels following the conversion of Baltimore to natural gas distribution.

E. E. Boegli, industrial engineer for South Carolina Electric & Gas Co., Charleston, S. C., won the second prize of $250 in cash for a sales promotion and educational program which included the unique feature of registering and certifying plumbing and heating contractors and dealers qualified to install gas house heating to the entire satisfaction of the consumers. This was Mr. Boegli's third prize winning entry in the Coroaire contest. He was awarded second prize in 1949 and won third prize in the 1950 gas house heating contest.

Outstanding individual accomplishments in the gas utility home service field were recognized at the convention when presentations were made to the five winners of the nation-wide AGA Home Service Achievement Award sponsored by McCall's magazine. Cash prizes totaling $1,000 and bronze plaques were awarded.

These honors were awarded to: Miss Mildred R. Clark, home service supervisor, Oklahoma Natural Gas Company, Tulsa, Okla.; Miss Dorothy F. O'Meara, home service director, The Bridgeport Gas Light Company, Bridgeport, Conn.; Miss Kathleen Atkinson, home service director, Providence Gas Company, Providence, R. I.; Mrs. Barbara F. Haller, supervisor of demonstration, The Ohio Fuel Gas Company, Columbus, Ohio; and Mrs. Eleanor Morrison, home service director, Michigan Consolidated Gas Company, Grand Rapids, Mich.

H. O. Vaars Is Appointed Rockwell Sales Engineer

H. O. Vaars has been appointed sales engineer for Rockwell Manufacturing Company by P. C. Kreuch, Chicago district manager. In his present position, he will service water and gas utilities and LP-gas accounts in Wisconsin and upper Michigan.

Prior to his recent appointment, Mr. Vaars served in a sales capacity with the Perfection Stove Company, Cleveland, and Pittsburgh Valve and Fittings Corporation, Barberton, Ohio.

Show New Wiggins Film On Gas Holders

A press preview of a new industrial film, "The Wiggins Gasholder," was held by The General American Transportation Corp. in the RCA exhibit hall, New York, on October 26.

The film is designed for showing before trade and industrial groups in industries where the storage of any kind of gas is required.

It portrays by means of photographs, animations and oral description on a sound track, the principle of the Wiggins waterless, frictionless seal for gas holders.

Late Court Decisions

(Continued from page 30)

accident, the weather and the like, because it knows these things often occur."

Also, in this case there was a dispute as to the ownership and control of the service pipe, but the court held that *to be immaterial* as the gas company was using the pipe at the time of the accident as a storage place for its product.

And again, see Koelach v. Philadelphia Company, 152 Pa. 355. This court held that while no absolute standard of duty can be prescribed, it is safe to say that every reasonable precaution suggested by experience and the known dangers ought to be taken by a gas company to know that its unused pipes are safe. This court said:

"This would require, in the case of a gas company, not only that its pipes and fittings should be of such material and workmanship, and laid in the ground with such skill and care, as to provide against the escape of gas therefrom when new, but that such system of inspection should be maintained as would insure reasonable promptness in the detection of . . . leaks that might occur from the deterioration of the material of

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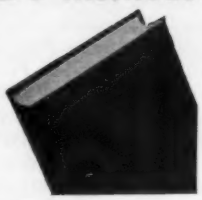

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12. You Can Improve Methods
13. How Your Job Changes
14. Are You Looking Ahead?

American Gas Journal

205 E. 42 St., New York 17, N. Y.

the pipes, or from any other cause within the circumspection of men of ordinary skill in the business."

And in Brown v. Kansas Natural Gas Company, 8 Cir., 299 F. 463, 466, the court refused to agree with a gas company's argument that as its pipe had been in the ground for 17 years, without leaking, the company employes had the right to assume that the pipes were safe until actual notice of deterioration or leak was brought to its attention.

It is well established law that neither a city or a gas company is liable in damages for an explosion of gas caused by a condition of which the officials and employes had actual or "constructive" knowledge. See Brininstool v. Michigan, 157 Mich. 172. This court said:

"It is the generally accepted rule that to entitle a plaintiff (consumer) to recover damages for apprehended future consequences of an injury there must be such a degree of probability of such consequences as to amount to reasonable certainty."

According to a late higher court decision "constructive" knowledge is any "knowledge" that may lead a reasonably prudent person to investigate whether a dangerous situation exists, and then correct it.

For example, in Kellom v. City of Ecorse, 45 N. W. (2d) 293, the testimony showed facts as follows: One Kellom sued a city for damages resulting from an explosion of gas alleged to have been caused by the negligence of the city in failing to maintain a sewer in reasonable repair, and in failing to investigate *a continuous depression* in a street intersection to discover a broken sewer and gas main under the street. The testimony showed that this depression in the street, although indicating that the sewer and gas lines were disrupted, had remained unrepaired for several months. Also, the escaping gas accumulated through the broken sewer and exploded in a building destroying the building and contents, burning and seriously injuring Kellom. The higher court sustained the verdict except to hold that Kellom's damage allowance should be reduced to $25,000. The court said:

"The defendant (city) claiming that the court should have directed a verdict for the defendant on the ground that the defendant was not guilty of any negligence, as a matter of law, and that the defendant had no notice or knowledge of a defective condition of the sewer. The proofs are to the contrary."

This was so because the foreman in the municipal public works department testified that while there were other holes in this street, "this spot was the toughest spot I had in my whole territory. As time went on I would have to fix it about every month, and every time I would fix it, it was going deeper."

In other words, knowledge of the city's employes that the hole in the street was a continuing hazard was "constructive" notice that a dangerous situation existed.

For comparison see Boyer, 276 N. W. 552. This court said:

"The testimony did not tend to show such probability of future injury as to amount to a reasonable certainty that the consequences suggested resulted from the original injury."

Question No. 3: "When and under what circumstances is a gas corporation obligated to extend its mains to supply gas to new consumers?"

A review of leading higher court decisions disclose the broad and general law, as follows: A gas company can be compelled to extend its mains and service if the expense involved and also the financial returns will "reasonably" compensate the company. Also, the courts hold that under *no* ordinary circumstances may a gas corporation refuse to extend or enlarge its service on direct proof that the immediate return on the investment is adequate to justify the ex-

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pense. And again, the public service commission, and higher court, may compel a gas corporation to supply gas to inhabitants in a newly and sparsely settled community if the evidence indicates that the population of the community is *likely* to increase *rapidly* whereby the corporation's investment in the extention is assured.

For illustration, in the leading case of New York v. New York Gas Company, 245 U. S. 345, the Public Service Commission ordered a gas corporation to extend its distributing system and mains to a community which was a rapidly growing settlement of 330 houses.

Testimony was given by officials of the gas company that the cost of making the extension would be approximately $86,000. The engineer for the Public Service Commission estimated the cost at considerably less. On the basis of the gas company's estimate of the cost its income immediately would be two and one-fourth per cent per annum. On the basis of the estimate by the commission the income would be four per cent. The evidence proved conclusively that the population of the community soon would increase to afford a much larger return on the company's investment. Therefore the Supreme Court of the United States upheld the commission's order to make the extension, saying:

"Corporations which devote their property to a public use may not pick and choose, serving only the portions of the territory covered by their franchises which are presently profitable for them to serve and restricting the development of the remaining portions by leaving their inhabitants in discomfort without the service which they alone can render. . . ."

For comparison see Boulevard Heights Corporation v. Rochester Gas Corporation (1922; N. Y.). In this case the public service commission decided that it would be "unreasonable" to order a gas corporation to extend its service into a new real estate development where there are now only a few customers to be served, and no indication that the population would rapidly increase to net a reasonable return on the necessary investment. The court said:

"The extensions requested would be in the interest of petitioner (real estate operator) and to its advantage in the sale of lots."

Also, see the leading case of Root v. New Britain Company, 99 Atl. 559, where the higher court held that an extension need not be made unless the testimony proves that the population of the new community will *soon* increase sufficiently to fully justify the cost of making the extension.

Officials of a gas company who do not desire to extend mains or service to serve a new community should accumulate convincing evidence that neither present nor future prospective earnings will "reasonably" justify the expense and investment.

For illustration, in Woodhaven Gas Company v. Nixon, 196 N. Y. S. 623, it was shown that a public service commission ordered a gas corporation to extend its mains to serve an isolated community. The corporation appealed to the higher court but did not introduce convincing testimony which proved that the commission's order was unreasonable. Therefore, the court stated law, as follows:

"It was not intended that the court should interfere with the commission or review their determinations further than is necessary to keep them within the law and protect the constitutional rights of the corporations over which they were given control."

In other words, the duty of a higher court in legal controversies involving extension of gas service is *not* to make new law, but its sole duty is to see that an order issued by a public service commission to serve new consumers is reasonable and its enforcement will not violate the gas corporation's legal rights under the United States and state constitutions.

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Honolulu Gas Company Announces Rate Petition Is Authorized

The Public Utilities Commission of the Territory of Hawaii has approved a request of the Honolulu Gas Company for a revision of its rate structure. The new rates, effective October 1, are estimated to increase the company's total annual revenue $366,000 or approximately 13 per cent.

The new general service and refrigeration rates are increased about $400,000 per year by elimination of the discount or prompt payment clause in the old rate schedules.

The company's customers who in the past have been served under the industrial and large commercial schedule will receive annual reductions amounting to $38,000. At the same time this schedule is being replaced by two new schedules. Large housing, hotel and apartment building users previously served under this schedule will be supplied under a new lower schedule designed for this purpose, and the strictly industrial and large commercial consumers will continue to be served under the industrial and large commercial schedule but at slightly lower rates than were previously in effect.

Justification for the lower rates to large volume users has been that the company through increased plant efficiency has been able to make available additional plant capacity, and the commission recognized this in approving load building rates.

The revised rate structure of the Company will permit it to approach a reasonable rate of return and provide greater flexibility in meeting competitive conditions.

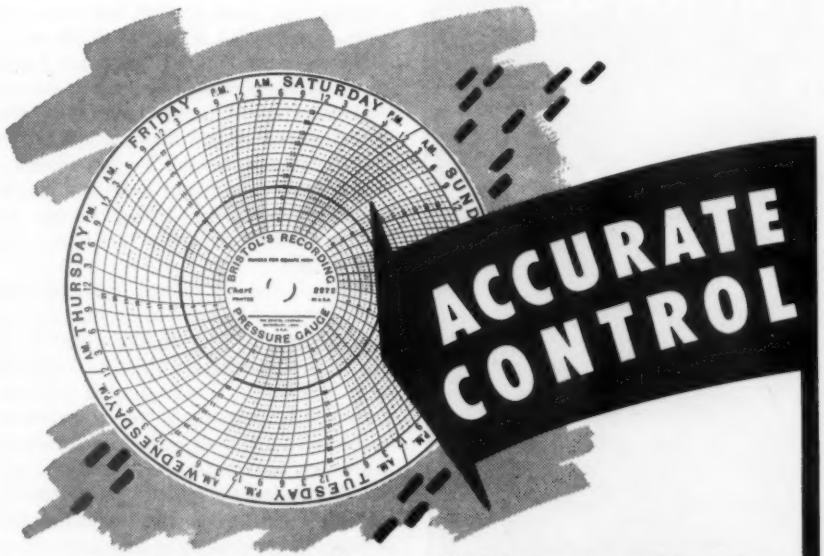
AGA Appoints A Committee On Underground Storage

A committee on underground storage was appointed at the recent AGA annual convention by Chas. E. Bennett, president, The Manufacturers Light & Heat Company, Pittsburgh, Pa., and chairman of the Natural Gas Department of AGA.

The duties of the new committee will be: (1) to assemble and publish statistical data relating to the development of underground gas storage and to encourage the publication of papers relating to the operation and scientific aspects of storage; (2) to encourage research and other forms of investigation relating to the solution of problems which arise from time to time in this important new phase of the gas industry.

Fenton H. Finn, New York State Natural Gas Corp., Pittsburgh, will serve as chairman of the committee on underground storage. Members will include: Frank Boyd, The Manufacturers Light & Heat Company, Pittsburgh; William F. Burke, Lone Star Gas Company, Dallas; M. V. Burlingame, Natural Gas Pipeline Company of America, Chicago; and Richard W. Camp, Consolidated Gas Utilities Corporation, Oklahoma City.

Also included are: Nelson P. Chesnutt, Southern Union Gas Company, Dallas; John B. Corrin, Jr., Hope Natural Gas Company, Clarksburg, W. Va.; Marion L. Fort, Pacific Lighting Gas Supply Company, San Francisco; H. L. Fruechtenicht, Jr., Michigan Gas Storage Company, Jackson, Mich.; Harry J. Gabel, Michigan-Wisconsin Pipe Line Company, Grand Rapids; John V. Goodman, Equitable Gas Company, Pittsburgh; George C. Grow, Jr., Transcontinental Gas Pipe Line Corp., Newark, N. J.; Russel W. Hofsess, Cities Service Gas Company, Oklahoma City; Frederic A. Hough, Southern Counties Gas Company of California, Los Angeles; Charles C. Ingram, Oklahoma Natural Gas Company, Tulsa; Lysle R. Kirk, The Ohio Fuel Gas Company, Columbus, Ohio; Grove Lawrence, Southern California Gas Company, Los Angeles; Edwin L. Rawlins, Union Producing Company, Shreveport; J. J. Schmidt, The East Ohio Gas Company, Cleveland; D. T. Secor, United Natural Gas Company, Oil City, Pa.; Charles W. Studt, Union Gas System, Inc., Independence, Kansas; E. C. Stump, United Fuel Gas Company, Charleston, W. Virginia. Eugene D. Milener, of AGA, will serve as secretary of the committee.



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Financial Comment

(Continued from page 18)

riod; and it brought their equity holdings to only $606 million at last report.

This total holding of common stocks by life insurance companies is far short of the total purchases by these institutions forecast by optimistic market observers when the New York State Legislature at its last session passed legislation enabling the life companies to invest in equity stocks.

While the utility stock market continues favorable for further financing by the gas and electric companies which still need a considerable amount of new money, the bond market has been slipping slowly of late to the point where yields now are about 10 per cent higher on the average than they were at the end of 1950. Highest quality issues now command an interest return of 2.91 per cent, second grades 2.96 per cent and third quality 3.09 per cent, compared with 2.65 per cent, 2.67 per cent and 2.78 per cent, respectively, last December 31.

Underlying the bond market's adverse behavior of late is a decided case of shakiness on the part of investment banking firms, stemming chiefly from the deal whereby Westinghouse Electric Corporation recently borrowed privately $300 million through 20-year bonds on a 3½ per cent basis. As if this one private bond deal with institutions was not enough—it has given rise to rumors that others of the country's industrial giants are in the market for similar deals.

With the larger institutions able to obtain this high a yield return from a prime industrial borrower, the thought prevails in investment quarters that the smaller insurance companies and others will be loath to "reach" for issues providing only three per cent yield return or less while there is a chance that they may be able to participate in a more profitable venture along the lines of the Westinghouse deal.

How great has been the confusion in the minds of the closest followers of the market—the underwriters themselves—may be seen from the very wide spread between the successful and unsuccessful bids for the recent issue of Eastern Gas & Fuel Company bonds which happened to be priced correctly by the winning syndicate and were disposed of immediately.

Further tests in the form of additional new issues will have to be awaited for a clue as to the possible direction of the bond market. But with long-term bond prices depressed mostly by the larger than anticipated mortgage supply and by a shift by savings banks into tax-exempt securities, close observers of the bond market do not look for any early move toward reduction of the already narrow differential between yields on short-term and long-term obligations.

A measure of confidence has been restored to the utility preferred stock market by the quick disposal of the $37.5 million Pacific Gas & Electric Company 5 per cent preferred stock. Priced to yield 4.90 per cent, this large issue 'went out the window' early on the day of its offering and the books closed by the underwriting syndicate.

"It takes more than one swallow to make a summer," however, to use an old adage. While the Pacific Gas issue was priced correctly it remains to be seen whether equal success will attend efforts of other utilities' managements to raise a portion of their needed funds via the preferred stock route.

Reverting to common stocks, we might mention that their recent unsettlement appears to be due both to the decline now taking place in corporate profits and subsidence of inflation fears.

Shorn of inventory profits—which at one time bulked so large as to cause the Department of Commerce to observe that they amounted to two billion dollars quarterly during the nine months ended last March 31—corporate profits now are expected to run at about an annual rate of $20 billion in the final three months of 1951. This would be a decline of no less than about 40 per cent from the $27.8 billion annual level which prevailed in the final quarter of last year.

Allaying of inflation fears is attributable to the two-fold effect of slower than expected movement of armament expenditures into high gear and by the higher personal and corporate taxes just voted by the congress. One result of the slowed armament drive is to postpone to about one year hence the introduction of peak armament spending at which time its effect is expected to be felt for only about a year or so, according to present revised thinking, compared with a much longer period anticipated heretofore.

The current level of common stock prices seems reasonable in relation to earnings and dividends. While diminishing inflation fears may well combine with a clouded outlook for general business operations and profits following the now anticipated short period of peak armament spending to prevent any marked upturn in equity share prices, this could very well be more of a boon than a curse to utility companies.

Already solidly entrenched in investors' minds—especially of the institutions—because of their conservative characteristics—they can become more attractive as a stabilizing economy takes away some of the so-called market romance glamor from the industrial shares.

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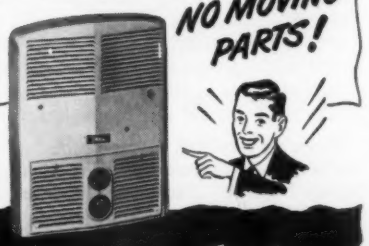

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Determining Main Size

(Continued from page 17)

mains. Prior to this "break even" point the present worth of future annual costs on the large main are more than on the two calculated small mains but beyond it the financial balance is in favor of the large main. Since cast iron gas mains have an expected life of at least 50 years, there is a distinct saving in carrying charges from the "break even" point to the end of the 50 years.

The "Break Even" Point

Similarly, Curve 1 shows the "break even" point for the large vs. two small mains based on different lengths of time that the first small main is estimated to reach its capacity and a second duplicate main is required. A study of this curve shows that for the main sizes listed, which have a cost ratio of two to three and a capacity ratio of one to two, it is cheaper in the long run in this example to lay the large main than to lay the small main, if it can be foreseen that the capacity of the small main will be reached prior to 20 years.

Curve 2 is included to cover the second group of mains which have a cost ratio of three to five and a capacity ratio of one to three. A study of this curve shows that for the main sizes listed it is the economic choice in this example to lay the large main if it can be foreseen that the capacity of the small main will be reached prior to 12 years. Furthermore, there is still available in the large main the equivalent capacity of one small main since the capacity of the large main is three times that of the small one. This available capacity becomes of value only if the equivalent capacity of two small mains is exceeded, because the present worth of future annual costs of three small mains rises rapidly and reaches the "break even" point in a few years as shown by lines marked "d" on Curve 2.

Curve 3 covers the case of four inch vs. six inch mains which have the cost ratio of three to four and the capacity ratio of one to three. A study of this curve indicates that it is cheaper in the long run under the assumed conditions to lay the six inch main if it can be foreseen that the capacity of the four inch main will be exceeded any time prior to 28 years. Furthermore, there is still available in the six inch main the equivalent capacity of a four inch main since the capacity of the six inch main is three times that of the four inch main. It, therefore, follows that under the assumed conditions a six inch main should be laid in place of the usual four inch low pressure main in the ordinary new business main extension, unless there are definite

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foreseeable limitations to the growth of the load.

Pumping and Maintenance Costs

In order to simplify the problem, the pumping and maintenance charges of the two plans under consideration have not been included in the computations. Since pumping costs are generally lower with a larger main, this saving would further favor the selection of the larger main. Due consideration must also be given to the maintenance charges of the two alternatives. The maintenance cost for a single small main is generally lower than for the next larger size main. However, the maintenance cost for two or more small mains is generally higher than for one large main. The pumping and maintenance costs must be added to the carrying charges, and then the totals compared on the basis of the present worth of these future annual costs.

Conclusion

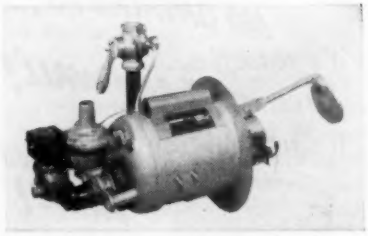
The engineering calculation of the size of a gas main is only one step in the selection of the proper size. The next step is to apply financial engineering to determine whether a certain calculated commercial size cast iron gas main or the next size larger should be laid to supply an increasing load or growing territory. It is imperative that the carrying charges of the alternatives be compared on the basis of the present worth of the future annual charges as outlined in this study.

It has been the purpose of this study to outline a method or approach to the dollar economics of gas main sizing. The values assumed are considered reasonable, and based on these assumed values, it can be concluded that:

If it can be foreseen that the capacity of the calculated commercial size main will be reached any time prior to about 20 years for those mains listed on Curve 1, about 12 years for those on Curve 2, and about 28 years for those on Curve 3, and hence will require the installation of a second duplicate main, then the next larger size main should be laid in the first place. In other words, the larger main need only be up to 50 per cent capacity any time prior to about 20 years to justify its installation for those mains listed on Curve 1, and only 33 per cent capacity any time prior to about 12 and 28 years for those mains listed on Curves 2 and 3 respectively.

Decisions based on first cost only may ultimately cost the gas utility company considerable sums of money.

Roberts-Gordon Introduces New Gas Burner



New Series 400-R Burner

Roberts-Gordon Appliance Corp., Buffalo, announces addition of a new Series "400-R" burner to its line. This burner has been developed for converting furnaces and boilers which were designed for use with oil burners. It is a gun type or inshot burner and is fired through the opening provided for the draft tube of the oil burner. The 400-R is adaptable for small, wet-base boilers as well as oil-fired gravity or forced warm air furnaces.

It has a maximum input rating of 175,000 Btu per hour, and is AGA listed for natural, mixed or manufactured gases. Simple design, fool-proof operation, low first cost, low operating cost and inexpensive installation are claimed by the manufacturer.

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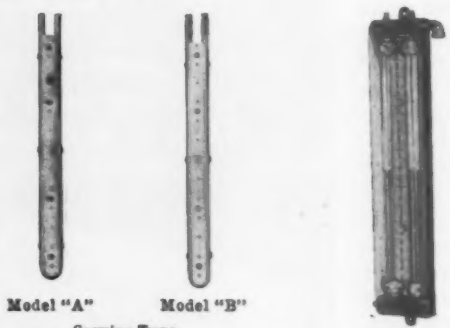

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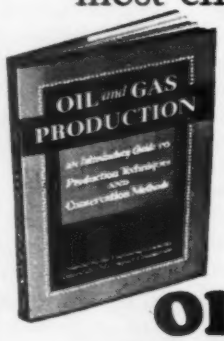

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Servel Names R. M. Stevens Advertising Manager

Robert M. Stevens has been named advertising manager of Servel, Inc., manufacturer of refrigerators, water heaters and air conditioners. His appointment was announced in Evansville, Ind., by John K. Knighton, Servel's vice-president in charge of sales.

Mr. Stevens has been with the company for six years, first as a regional advertising and sales promotion representative and later as assistant advertising manager. Since January he has been sales manager of the Servel New York Corp., the company's distributing subsidiary for the greater New York area.

Mr. Stevens' place as dealer sales manager of the Servel New York Corp. will be taken by Clifford A. Stockhoff, who has been a member of the Servel sales organization since his graduation in 1936 from Stevens Institute of Technology. Most recently he has been district sales manager at Columbus, O.

Donald M. Mackie Is President Of NY Council of Navy League

Donald M. Mackie, public relations director of Commonwealth Services, has been elected President of the New York Council of the Navy League.

Bowser Introduces Heavy Duty Automatic Gas Incinerator

Incinor Model S-224.

A new automatic, heavy-duty gas-fired incinerator has been designed to handle the disposal of wet or dry garbage and combustible refuse in stores, institutions, clinics, small apartment houses and multiple dwellings. This information was released by J. G. Dierkes, general manager of the Incineration Division, Bowser, Inc., Cairo, Ill.

This unit has a 4-bushel capacity and is known as the Incinor Model S-224. It is approved by the AGA Laboratories for use with natural, manufactured and mixed gases.

The burner unit employs a "ribbon" type flame and has an input of 40,000 Btu. A thermocouple shut-off control serves as a protection against both gas and flame failure.

An insulated charging door is located, waist-high, in the cast iron top. The grates are cast iron; the drawer-type ash receiver is located in the base; the firing chamber is made of welded steel; the outer casing is finished in baked silocone base aluminum enamel.

Richard A. Rosan Joins Columbia Gas System

Richard A. Rosan, who has been associated with the law firm of Cravath, Swaine and Moore, New York since 1936, joined the legal department of The Columbia Gas System, Inc., recently.

A native of Milford, Conn., Mr. Rosan received a bachelors degree from Cornell University in 1933 and a law degree from Yale in 1936.

Since his return from military service in 1945, Mr. Rosan has worked almost exclusively on legal affairs connected with the Columbia Gas System, participating in the system's integration proceedings and financing. More recently, he has been concerned with rate matters, which will be one of his responsibilities in his new position.

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100% Natural Gas

(Continued from page 38)

gen gas in the mixture, there is a point where not so many changes will be necessary, and this method, if practical, will permit the conversion to be completed at a considerably lower cost than required for 100 per cent natural gas. In our situation the changeover to 800 Btu, 0.58 specific gravity gas cost about $12 per customer. Other companies that have gone to 100 per cent natural gas have paid as high as $20 or more per customer.

Consideration of Mixed Gas

A mixture of natural gas and manufactured gas has some definite advantages over 100 per cent natural gas:

1. The mixture should utilize present production methods so that little or no expense will be required for plant conversion. The idea is to find a mixture with as high a Btu and with such a specific gravity as will permit maximum interchangeability on the appliances, with a maximum use of present production facilities, with as little change or addition to plant equipment as possible. The solution of this problem requires extensive tests of gas mixtures.

2. The adoption of a base gas mixture for which supplemental or interchangeable mixtures can be produced on present production facilities will eliminate, to a large degree, the possibility and probability of interruption of service to customers in the event of a natural gas interruption.

3. Increase in load can be supplied with entire dependence upon natural gas. As mentioned before, natural gas might not be obtainable when required for increased business. It seems better to be able to take on the added load and produce it if necessary, than to run short of natural gas and have to curtail usage and refuse additional load. No business can prosper by refusing to take more business. We want to grow, and add load, and meet competition, and our studies have showed that we can add the greatest volume of firm gas sales by the use of the proper percentage of natural gas and manufactured gas.

Conclusions

The various advantages and disadvantages of the two types of new base gas were weighed against each other in a number of studies and the decision was made in favor of the mixed gas. The answer in our case was "100 per cent natural gas is *not* the answer."

The next problem, then, to be settled was: "What shall be the characteristics of the new mixed gas: What shall be its Btu and specific gravity?" There were numerous phases to the answer to this question, but they grouped themselves into three principal considerations:

1. A study of the fuels and processes available for production and how they could be used best. (a) to give good service to the customer at reasonable rates, and (b) to produce gas more economically and efficiently for a reasonable return with the least investment for new plant.

2. A study of the performance of the customers' appliances with different gases. This included a complete study of interchangeability of one gas with another.

3. A definite plan for the conversion of the territory to the new standard.

These three groups will be discussed in the following sections.

The second part of Mr. Boyer's paper will appear in the December issue of AMERICAN GAS JOURNAL.

E. D. Van Fossen Now in Seattle For Cooper-Bessemer

The appointment of Edward D. Van Fossen to Cooper-Bessemer's regional field office in Seattle, Washington, has been announced by Stanley E. Johnson, Cooper-Bessemer vice-president. Working directly under Robert C. Jones, Cooper-Bessemer branch manager, Mr. Van Fossen will concentrate his efforts in furthering Cooper-Bessemer's engineering service to users of heavy internal combustion engines, pumps and compressors in the northwest sector of this country.

Mr. Van Fossen graduated in mechanical engineering from the University of Washington and has been associated with Cooper-Bessemer for the past three years at their main plant in Mount Vernon, Ohio.

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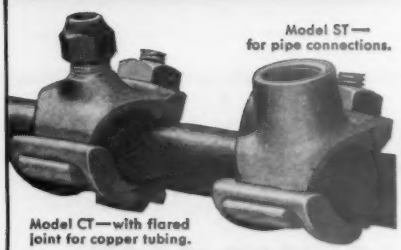

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E. Rowland English Joins Pipe Protection Service

Pipe Protection Service, Inc., Elizabeth, N. J., has announced that E. Rowland English has joined its organization as vice-president. Mr. English will be in charge of sales and will also serve as assistant general manager. Pipe Protection operates coating and wrapping plants at Elizabethport, New Jersey, Lowell, Massachusetts and at customers' job sites.

Mr. English was formerly eastern division manager for H. C. Price Co., Somastic division.

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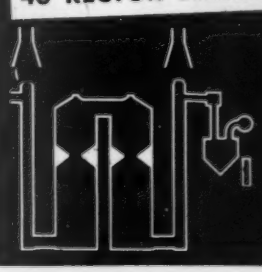

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CONVENTION CALENDAR

November

15-17 New Jersey Utilities Association Annual Meeting Seaview Country Club, Absecon, N. J.

25-30 American Society of Mechanical Engineers, Chalfonte-Haddon Hall, Atlantic City, N. J.

December

2-5 American Society of Refrigerating Engineers, Annual Meeting, Hotel Roosevelt, New Orleans, Louisiana.

3-5 Institute of Cooking and Heating Appliance Manufacturers, Semi-Annual Meeting, Cincinnati, Ohio.

5-6 National Warm Air Heating and Air Conditioning Association, Annual Meeting, Hotel Cleveland, Cleveland, Ohio.

5-7 National Association of Manufacturers, Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y.

March

10-15 National Association of Corrosion Engineers, Galveston, Tex.

27-28 Oklahoma Utilities Association, Biltmore Hotel, Oklahoma City, Okla.

27-28 New England Gas Association, Annual Meeting, Hotel Statler, Boston, Mass.

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1. The names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Elliott Taylor, 205 E. 42nd St., N.Y.C. 17; Editor, Elliott Taylor, 205 E. 42nd St., N.Y.C. 17.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) American Gas Journal, Inc., 205 E. 42nd St., N.Y.C. 17; Estate of E. Holley Poe, 1 Wall St., N.Y.C. 5; Elliott Taylor, 205 E. 42nd St., N.Y.C. 17.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

ELLIOTT TAYLOR, Publisher.

Sworn to and subscribed before me this 28th day of September, 1951.

(Seal) EUGENE JELINEK

(My commission expires March 30, 1953.)

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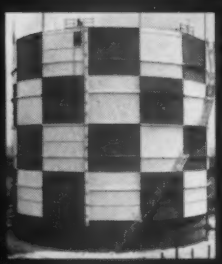

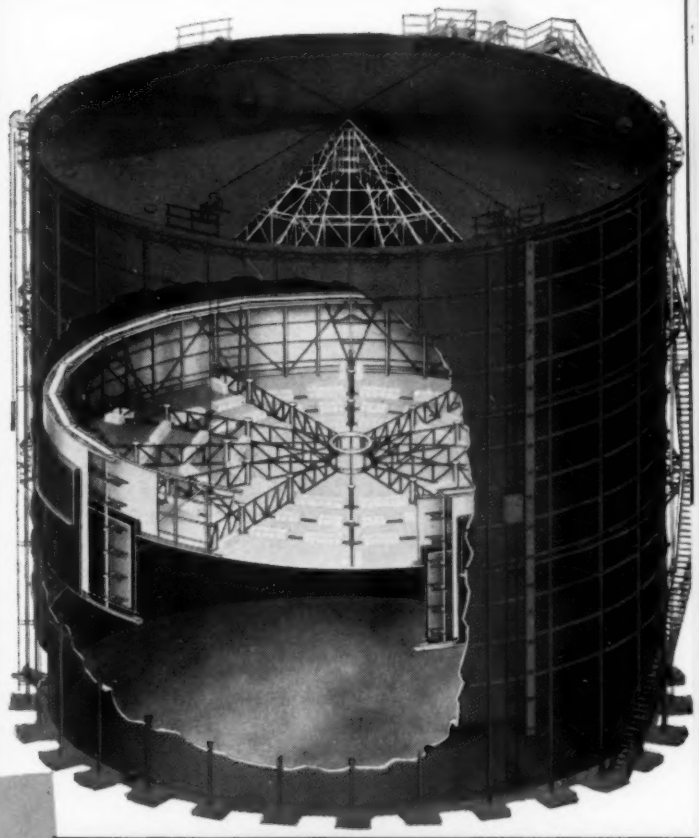

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See American Gas Association Builder's Committee Report (May, 1951)

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